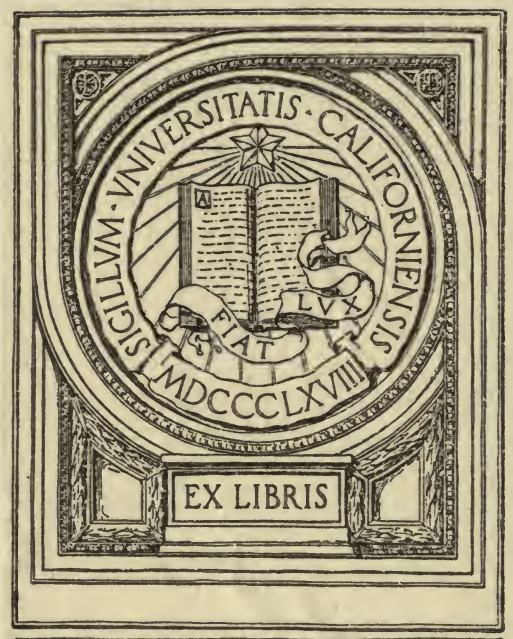


EDUC.
LIBRARY

Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

http://www.archive.org/details/somegeneralprinc00bobbrich

LB5
N2
Ser.2
V.12
EDUC.
LIBRARY

Copyright 1913 By
S. Chester Parker
Secretary of the Society

All Rights Reserved

Published February 1913

UNIV. OF
CALIFORNIA

Composed and Printed By
The University of Chicago Press
Chicago, Illinois, U.S.A.

SOME GENERAL PRINCIPLES OF MANAGEMENT APPLIED TO THE PROBLEMS OF CITY-SCHOOL SYSTEMS

FRANKLIN BOBBITT
Instructor in Educational Administration, University of Chicago

I. INTRODUCTION

At a time when so much discussion is being given to the possibilities of "scientific management" in the world of material production, it seems desirable that the principles of this more effective form of management be examined in order to ascertain the possibility of applying them to the problems of educational management and supervision. This paper attempts to suggest what some of the principles would probably mean when applied to the labors of our field.

Management, direction, and supervision are functions of all co-operative labor. While men act singly, direction can find no place; but when men co-operate for common ends, one must direct the diverse labors of the group in order to secure unity and effectiveness. The tasks of direction arose with the rise of human organization. Directive labors differ naturally from group to group in their specific details; but whether the organization be for commerce or for manufacture, philanthropy or education, transportation or government, it is coming to appear that the fundamental tasks of management, direction, and supervision are always about the same.

In any organization, the directive and supervisory members must clearly define the ends toward which the organization strives. They must co-ordinate the labors of all so as to attain those ends. They must find the best methods of work, and they must enforce the use of these methods on the part of the workers. They must determine the qualifications necessary for the workers and see that each rises to the standard qualifications, if it is possible; and when impossible, see that he is separated from the organization. This requires direct or indirect responsibility for the preliminary training of the workers before service, and for keeping them up to standard qualifications during service. Directors and supervisors must keep the workers supplied with

detailed instructions as to the work to be done, the standards to be reached, the methods to be employed, and the materials and appliances to be used. They must supply the workers with the necessary materials and appliances. They must place incentives before the worker in order to stimulate desirable effort. Whatever the nature or purpose of the organization, if it is an effective one, these are always the directive and supervisory tasks.

It appears possible therefore to find inherent in the nature of effective, fully developed human organization, of whatever sort, certain general principles of management and supervision that have universal applicability. These general principles have been recognized by different social organizations with very unequal degrees of clearness, and their application to the problems in hand has been made also with varying degrees of completeness. The principles appear to be most clearly conceived and to have been most fully and completely worked out by certain portions of the industrial and business world. Certain railroads and manufacturing corporations have gone farther in this direction than government, or philanthropy, or education, or any of the less materialistic institutions. These latter institutions, are, however, in fact, at present taking over the lessons to be taught by the industrial world; and they are busily making application of proven principles of good management to the special problems of their own field.

Educational workers can, therefore, perhaps see the nature of some of these principles of supervision rather more clearly from observing their application in other fields of human labor, partly because they have been more completely developed and applied in those fields, and partly because they can be viewed in a more objective and impersonal manner. In undertaking our discussion of certain of these principles, it seems well, therefore, to state and illustrate each of them in their most general form as they apply to any organization; then to show in detail how each of them has been worked out in the field of education; or, as it is unfortunately too often the case with us, how it is being worked out and the probable lines along which it is yet to be further developed.

Although we are in our field rather backward as compared with portions of the world of affairs in the recognition and development of some of these principles, together with their corollaries; yet, as a matter of fact, all of them are recognized in our work in greater or lesser degree;

and without exception, each is at present in process of rapid development. We can excuse our relative backwardness on the ground that our educational systems are institutions of very recent growth. Present-day forms of organization in the business world began in the Middle Ages. Our large and complicated public-school systems, however, have been mostly developed thus far, in matters of organization and supervision, within the memories of men now living. We are doing pioneer work as compared with the older institutions; we think we have a right, therefore, to expect some of these older institutions to show us the elements of organization that make for strength, and the elements of supervision that make for effectiveness.

In making application of these principles to the educational field, we shall find ourselves at times confronted with tasks for which our profession is at present almost wholly unprepared. Much of our present educational labor is on so low and empirical a level that a great many preliminary steps will have to be taken before we can raise our methods to the place demanded by the higher and more refined forms of empiricism; or yet, to the still higher plane of scientific control. Recognition of the principles, however, is necessary to any constructive program. It is for this reason that we have not hesitated in our discussion to make deductive application of principles or of their corollaries which cannot actually be applied in our supervisory labors until a number of preliminary and prerequisite tasks have been accomplished. While some of the matters discussed may therefore be impracticable for actual supervision at present, or in the immediate future, they are presented with a belief that they are highly practical for the investigations that lie just ahead of us, on the basis of which we can bring about such forms of scientific supervision and control in the educational world as already exist within certain other institutions.

It is not, in fact, possible at present to write a satisfactory practical handbook of school management or school supervision. So rapid have been recent changes in educational thought, that books on either of these topics of a type that was considered altogether permissible ten years or even so recently as five years ago, can no longer be written; and the facts are not yet at hand in sufficient quantity on the basis of which to write a practical handbook of school management of a type that will satisfy the current demands of progressive educational leaders. Any paper on the topic during our present transitional period can do little

more than suggest the constructive program on the basis of which the facts may be accumulated which will permit the writing of such a practical handbook some years hence.

In making suggestions for a constructive, forward-looking program, it is necessary to assume that we are at present in a stage of incomplete development. While all, or at least most, of the elements of educational progress probably look squarely in the right direction, yet we have to admit that in the case of some of them the amount of progress yet made is not considerable. When we have occasion at times to mention this incompleteness of development as the basis on which further building is to be done, it is not intended as uncharitable or unsympathetic criticism of present-day conditions. It is only to point out incompleteness. To say of a new building that is in process of construction that only the foundation has been laid is not a criticism of the building. It is only to point out the stage of construction in which it happens for the moment to be.

Such a building is to be judged not from the visible portion but from the architect's plans. Any particular educational system is likewise not to be judged from the incomplete beginnings actually visible, but by the architectural plans which have been drawn up by those in charge of the work, and which show the ends of which the present elements are but the beginning. In the building world, although the plans of the architect picture nothing that actually exists, yet these forward-looking plans constitute the practical and indispensable basis of all constructive work that is to be done.

In the building of a great educational structure, such as the one upon which we are now engaged, it appears that such forward-looking plans are equally practical and indispensable bases for work. They show something definite toward which to strive and on the basis of which all effort can be organized and co-ordinated. I am unable to conceive of any more practical labor that could be undertaken by the educational world than the definite drawing-up of systematic forward-looking plans on which our constructive labors might be based. The chief purpose of the following suggestions is to make clear this need. The work itself must be a co-operative task on a large scale.

II. STANDARDS

Principle I.—Definite qualitative and quantitative standards must be determined for the product.

Principle II.—Where the material that is acted upon by the labor processes passes through a number of progressive stages on its way from the raw material to the ultimate product, definite qualitative and quantitative standards must be determined for the product at each of these stages.

The world of material production cannot so much as begin its work until it has definite plans and specifications as to the nature of the product that is to be turned out. To take a single instance from among countless familiar instances, a steel plant manufacturing rails for railroads must have, before it can begin its task, definite specifications as to the nature of the rails to be turned out. The rail, for example, must be thirty feet in length, and weigh eighty pounds to the yard. It must be be seven and three-eighths inches in height, with a head two and one-half inches wide and one and one-half inches deep, a web thirty-five sixty-fourths of an inch in thickness and five inches deep, and a base five inches wide. The under surface of the base must be plane and the top surface of the head must be curved in the exact form shown by the drawings that accompany such specifications. Equally definite likewise are the specifications as to chemical quality, physical qualities, tempering, and the like.

With these definite standards as to the nature of the ultimate product before him, the superintendent of the plant is prepared to organize all of the forces at his command, to direct them, and to supervise them in such fashion as to secure just the product desired. He is able to select the most suitable machinery for the task and to make the necessary adjustments. He can tell instantly whether his machinery produces the desired product or not by measuring the actual product and comparing it with the standard product. He can know when machinery is to be altered or discarded, and another form substituted that will produce the standard product. He can know whether the workmen are doing the thing that is expected of them. Thus he can instantly detect good work and poor work among the men. He can know who needs help and who needs none. After trial he can know what one needs further training during service and what one would best be transferred to some other department or discharged. He has a basis for judging labor methods likewise. The product which results from the use of different methods

can be measured up against the standard, and determination can easily be made of the relative efficacy of different methods.

In the absence of such standards, the superintendent of the plant is helpless. If his instructions are merely general, they cover such a possible variety of products that he cannot know with certainty what to do. If given an order by some contracting railway in such general terms as, "Make us a supply of steel rails," he cannot know how long to make the rails, whether they shall be straight or curved, heavy or light, high or low, cast-iron or rolled steel, high carbon or low carbon, tempered hard or tempered soft, whether the edges shall be angular or rounded, whether the weight shall be uniform in the different portions, whether the cross-sections shall be T-shaped or a simple rectangle. He cannot know the quantity to make, nor the date upon which it is to be finished. Unless he sets up an arbitrary standard of his own, he cannot direct his men, since he has no ends toward which to direct them. He cannot know whether the men are doing good work or poor work since he has no standards to measure it by. The men may make rails; but unless limited by standards they will necessarily be of great variety, with most of them useless for practical service.

It is well to note also, for our purposes, that the standard qualifications of the product are not determined by the steel plant itself. The qualitative and quantitative specifications are determined by those that order the product, in this case, the railroads. The steelmills are but agents of the railroads for the performance of this specific function. Naturally the steel plant, since it is performing a specialized function for the transportation world, must not only be expert in its own special field, but must have a good general knowledge of the needs of the transportation world. Still, notwithstanding this expertness and this necessary width of information, it is the transportation world that determines all qualitative and quantitative standards for this particular product.

The principle stated at the head of this chapter is probably general and applies not only to the management of labors in the field of purely material production, but also to the control of co-operative labor in the field of biological and psychological production as well. Education is a shaping process as much as the manufacture of steel rails; the personality is to be shaped and fashioned into desirable forms. It is a shaping of more delicate matters, more immaterial things, certainly; yet a shaping

process none the less. It is also an enormously more complex process because of the great multitude of aspects of the personality that are to be shaped if the whole as finished is to stand in full and right proportions.

In the field of biological production, of which education constitutes one sort, the factor of growth enters in to complicate and in part to obscure the working of our principles. Within the seed planted by the farmer, for example, the standard product appears to be already infolded and predetermined without man's aid. All that is necessary apparently is to cultivate and to protect, leaving the rest to sun and rain and the growth-factor. The product arrives in due season whether there are standards for the product in the farmer's mind or not. As a matter of fact, however, the standard contained potentially within the undeveloped germ may be such that, in the case of corn, let us say, with the best cultivation the plant must be small with a single ear poorly filled out; or it may be a large vigorous stalk with two large full ears. It may produce ten bushels to the acre or it may produce a hundred. Of potatoes, the average yield in our country per acre over a series of years is ninety-six bushels. In 1907, the lowest average per acre was sixty-five bushels; and this, too, in the great agricultural state of Kansas. The highest average for any state was in the desert state of Wyoming, two hundred bushels to the acre. One man in Wyoming averaged for his farm over a thousand bushels to the acre. He had set his standard at one thousand and, having a standard to work toward, controlled conditions accordingly and reached it. It was not superior soil or climate; it was having a high standard on the basis of which to adjust and control all the necessary processes. In these illustrations it may be noticed that the growth-factor does a part of the work; but that this factor working alone can produce only an inferior product. Man must set up standards and arbitrarily control conditions even here in order that, with the aid of the growth process, he may secure the full possible product.

In education it is the same. The growth-process will of itself do much to unfold the various latent aspects of the personality. The teacher may simply assign lessons and hear lessons without any thought of possible quantitative standards, trusting that the enfolded possibilities will expand of themselves into proper strength and proportions. With this system of procedure it has been found that, among school systems all of which are above the average, one eighth-grade class will add at the rate of thirty-five combinations per minute, while another

eighth-grade class not dissimilarly located will add at an average rate of one hundred and five combinations per minute, or three times as fast. In two schools of similar grade, located within the same city, it is found that the sixth-grade pupils in one of them will write at a speed of 58 letters per minute with a quality of 53, Ayres's standard; while the sixth-grades classes in the other school write at an average speed of 115 letters per minute, with an average quality of 50. Quality being practically the same in the two schools, the quantitative standards reached by one school were twice as high as those reached by the other. If so great variety is to be found among pupils of supposedly equal ability in these so-called standard subjects in matters the most simple, fundamental, and mechanical, we may reasonably expect that in the higher, more complicated matters of science, history, and the humanities, the variations are much greater. Unfortunately we have no exact measurements in these fields. The facts given above, however, taken from the simpler fields, indicate that teaching without standards, trusting unduly to the growth-factor to determine the limits may result in a low or a high product. In education, apparently the growth-factor does a part of the work; but, unless standards for this growth are definitely set up, teachers and supervisors have nothing definite to aim at. And the actual average of preformance is sure here as in agriculture to be but a per cent, sometimes a small per cent, of the possible performance.

So long as education is content merely to set the conditions of growth in a general way without reference to standards of growth, the educational supervisor, though relatively less helpless than the director of the steel plant, is yet in his turn relatively helpless. Having no standards he cannot know how long to continue developmental influences, whether one year or ten years. He cannot know how intensively to exercise these influences, nor the amount of daily or weekly time to give. He cannot know whether the relative emphases upon the development of different aspects of personality are properly proportioned. He cannot know except in vague general ways what methods are proving best or what teachers are doing the best work because of the lack of clearly defined standards with which to measure the results of the various methods employed by the various teachers.

Within the past decade we have come to see that it is possible to set up definite standards for the various educational products. The ability to add at a speed of 65 combinations per minute, with an accuracy

of 94 per cent is as definite a specification as can be set up for any aspect of the work of the steel plant. The desirable qualities of mathematical computation, in any of its forms, are speed and accuracy. It is possible in the case of every desirable mathematical operation to set up standards of speed and standards of accuracy. Obviously, these can be low or high. A standard of 30 combinations per minute with an accuracy of 75 per cent is very low as compared with a standard of 100 combinations per minute with an accuracy of 98 per cent. For certain classes of students, bookkeepers and accountants for example, the standards need to be high; for other classes of workers, musicians, for example, or bricklayers, the standards set may well remain fairly low and their energies be expended upon other matters more important for them.

Setting up standards of ultimate attainment can be of but little service unless we have at the same time the necessary scales and methods for measuring the educational product so as to determine with at least reasonable accuracy whether the product rises to standard. Ordinarily, the teacher, if asked whether his eighth-grade pupils could add at the rate of 65 combinations per minute with an accuracy of 94 per cent, could not answer the question; nor would he know how to go about finding out. He needs a measuring scale that will serve him in measuring his product as well as the scale of feet and inches serves in measuring the product of the steel plant. The labors of Mr. T. W. Stone and of Mr. S. A. Courtis have shown the possibility of determining practical usable measuring scales for arithmetical ability.

Mr. Courtis has tentatively determined measuring scales for ability in addition, subtraction, multiplication, division, the rate of motor activity in copying figures, the speed of solving simple one-step reasoning problems, the solution of abstract problems involving all of the four fundamental operations with integers, and the speed and accuracy of solving two-step problems involving reasoning—eight scales in all. Each scale is drawn up in such fashion that each unit of work is intended to be equal with each other unit of work in the scale, just as in a foot-ruler each inch is of the same length as each other inch. In the addition scales, for example, as shown below, each group of five combinations is of the same degree of difficulty and requires the same amount of work as each other group of five combinations. The same method of forming equal units is used in connection with the scales for subtraction,

for multiplication, for division, and for copying figures. In test No. 6, the simple reasoning speed test, each problem is intended to be of the same difficulty as each other one. In test No. 7, the ability to handle the four fundamental operations, the problems are grouped in such fashion that each unit is the equal of each other unit. The two problems in addition are the equal of the one problem No. 3 in multiplication. Units No. 7 and 8, it will be noticed, are to be found within the same multiplication problem which is one of double the difficulty of unit No. 3. Four of the eight measuring scales are here reproduced.[1]

Each scale is intended to measure the amount of work that can be performed within a given time and to measure its accuracy. For the simpler problems, the first six scales in fact, the standard allowance is one minute. For scale No. 7, it is 12 minutes; and for scale No. 8, it is 6 minutes. The pupils in a class are measured by starting all of them at the same instant at the beginning of the scale and stopping them at the end of the standard time allowance. The operations performed

ARITHMETIC

TEST NO. 1. SPEED TEST—ADDITION

1 6 9 0 4	1 7 9 3 2	1 3 6 0 3	8 9 7 8 2
2 6 5 1 2	3 7 6 0 4	5 8 9 7 2	1 9 6 0 5
1 4 8 0 2	3 4 7 0 3	1 2 5 6 7	5 8 6 9 4
6 7 9 5 7	1 6 9 8 5	4 9 8 0 2	1 3 5 0 3
2 9 7 4 5	1 3 8 2 3	4 8 9 5 3	1 8 6 0 5
2 3 8 0 2	7 9 5 0 7	1 8 7 0 6	9 4 7 2 4
7 4 8 0 3	9 2 5 0 6	2 4 5 1 6	3 7 9 0 4
1 9 6 0 4	1 8 7 4 3	1 8 9 0 2	3 4 8 6 5
4 8 5 0 7	5 9 6 7 5	1 6 7 0 2	6 9 8 1 2
4 2 6 9 3	5 2 8 0 3	8 4 5 3 6	1 4 7 1 3
1 7 9 3 2	8 9 7 8 5	1 2 6 0 3	1 4 9 0 4
3 7 6 0 4	1 9 6 0 2	6 7 9 7 2	6 7 5 1 2

[1] These scales are reproduced through the courtesy of Mr. S. A. Courtis. The complete series of scales can be found in his *Manual of Instructions*, published by S. A. Courtis, 82 Eliot St., Detroit, Michigan.

ARITHMETIC

Test No. 6. Speed Test—Reasoning

Do not work the following examples. Read each example through, make up your mind what operation you would use if you were going to work it, then write the name of the operation selected in the blank space after the example. Use the following abbreviations: "Add." for addition, "Sub." for subtraction, "Mul." for multiplication, and "Div." for division.

	Operation	
1. A girl brought a collection of 37 colored postal cards to school one day, and gave away 19 cards to her friends. How many cards did she have left to take home?		
2. Five boys played marbles. When the game was over, each boy had the same number of marbles. If there were 45 marbles altogether, how many did each boy have?		
3. A girl, watching from a window, saw 27 automobiles pass the school the first hour, and 33 the second. How many autos passed by the school in the two hours?		
4. In a certain school there were eight rooms and each room had seats for 50 children. When all the places were taken, how many children were there in the school?		
5. A club of boys sent their treasurer to buy baseballs. They gave him $3.15 to spend. How many balls did they expect him to buy, if the balls cost 45c. apiece?		
6. A teacher weighed all the girls in a certain grade. If one girl weighed 79 pounds and another 110 pounds, how many pounds heavier was one girl than the other?		
7. A girl wanted to buy a 5-pound box of candy to give as a present to a friend. She decided to get the kind worth 35c. a pound. What did she pay for the present?		
8. One day in vacation a boy went on a fishing trip and caught 12 fish in the morning, and 7 in the afternoon. How many fish did he catch altogether?		
9. A boy lived 15 blocks east of a school; his chum lived on the same street, but 11 blocks west of the school. How many blocks apart were the two boys' houses?		
10. A girl was 5 times as strong as her small sister. If the little girl could lift a weight of 20 pounds, how large a weight could the older girl lift?		
11. The children of a school gave a sleigh-ride party. There were 270 children to go on the ride and each sleigh held 30 children. How many sleighs were needed?		
12. In September there were 43 children in the eighth grade of a certain school; by June there were 59. How many children entered the grade during the year?		
13. A girl who lived 17 blocks away walked to school and back twice a day. What was the total number of blocks the girl walked each day in going to and from school?		
14. A boy who made 67c. a day carrying papers, was hired to run on a long errand for which he received 50c. What was the total amount the boy earned that day?		
15. Two girls played a number game. One girl's score was 57 points; the score of the other girl was 43 points. By how many points did the first girl win the game?		
16. Five boys gathered 985 nuts which they put into one large pile. Out of this they made five small piles. How many nuts were there in each of these piles?		
Total Right		

ARITHMETIC

Test No. 7. Fundamentals

In the blank space below, work as many of these examples as possible in the time allowed. Work them in order as numbered, writing each answer in the "answer" column before commencing a new example. Do no work on any other paper.

No.	Operation	Example	Answer	Right	
1	Addition....	*a* 30+735+123=....(Write answer in this column) ☞			
		b 141+9021+102+2020=.....			
2	Subtraction	*a* 4387−165=.....			
		b 934762−821021=.....			
3	Multiplication.	2102×321=.....			
4	Division.....	318864÷312=.....			
5	Addition....	7024+342+4700+7005+2040+563=.....			
6	Subtraction...	82311024−46973687=.....			
7	Multiplication.	65048×546=.....			
8					
9	Division.....	19055832÷4=.....			
10	Division.....	2753296÷364=.....			
11					
12	Addition....	55843+76868+66989+58393+79656+57866+38575+75967=.....			
13					
14	Subtraction...	15542634−7865875=.....			
15	Multiplication.	98756×768=.....			
16					
17	Division.....	34834506÷7=.....			
18	Division.....	7636399÷967=.....			
19					

ARITHMETIC

Test No. 8. Reasoning

In the blank space below, work as many of the following examples as possible in the time allowed. Work them in order as numbered, entering each answer in the "answer" column before commencing a new example. Do no work on any other paper.

	Answer	
1. The children in a certain school gave a Christmas party. One of the presents was a box of candy. In filling the boxes, one grade used 16 pounds of candy, another 17 pounds, a third 12 pounds, and a fourth 13 pounds. What did the candy cost at 26c. a pound?		
2. A school in a certain city used 2516 pieces of chalk in 37 school days. Three new rooms were opened, each room holding 50 children, and the school was then found to use 84 sticks of chalk per day. How many more sticks of chalk were used per day than at first?		
3. Several boys went on a bicycle trip of 1,500 miles. The first week they rode 374 miles, the second week 264 miles, the third 423 miles, the fourth 401 miles. They finished the trip the next week. How many miles did they ride the last week?		
4. Forty-five boys were hired to pick apples from 15 trees in an apple orchard. In 50 minutes each boy had picked 48 choice apples. If all the apples picked were packed away carefully in 8 boxes of equal size, how many apples were put in each box?		
5. In a certain school 216 children gave a sleigh-ride party. They rented 7 sleighs at a cost of $30.00 and paid $24.00 for the refreshments. The party traveled 15 miles in 2½ hours and had a very pleasant time. What was each child's share of the expense?		
6. A girl found, by careful counting, that there were 2400 letters on one page of her history, and only 2295 letters on a page of her reader. How many more letters had she read in one book than in the other if she had read 47 pages in each of the books?		
7. Each of 59 rooms in the schools of a certain city contributed 25 presents to a Christmas entertainment for poor children. The stores of the city gave 1986 other articles for presents. What was the total number of presents given away at the entertainment?		
8. Forty-eight children from a certain school paid 10c. apiece to ride 7 miles on the cars to a woods. There in a few hours they gathered 2765 nuts. 605 of these were bad, but the rest were shared equally among the children. How many good nuts did each one get?		
Total		

by each pupil are counted and thus is determined the speed rate for each pupil. By averaging the various rates, one finds the average

speed of the class. By counting the number correct and the number incorrect, and calculating percentages, one has the relative accuracy of each pupil; and by averaging the accuracy coefficients, one can determine the average accuracy for the entire class. Table I shows the average speed for each of the school grades in each of the eight operations based upon the speed measurement of about nine thousand pupils distributed among a dozen different cities. For the first five scales only the number of correct operations are shown. For scales No. 6, 7, and 8 both "attempts" and "rights" are shown.

TABLE I*

GRADE AVERAGES FROM TOTAL DISTRIBUTIONS

GRADE NO.	AVERAGE OF SCORES FOR EACH TEST	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6		No. 7		No. 8	
							Ats.	Rts.	Ats.	Rts.	Ats.	Rts.
1	55	6	6	..	..	29	...	...	....	....	...	...
2	75	21	12	10	12	51	...	...	....	....	...	...
3	525	26	19	16	11	63	2.8	2.1	5.4	1.7	2.7	0.6
4	1,222	33	25	23	21	70	3.7	2.5	6.6	3.6	2.6	0.8
5	1,177	40	32	30	28	80	4.4	3.4	9.0	5.3	2.8	1.2
6	1,282	46	37	34	35	88	5.1	4.4	10.3	6.9	3.4	1.7
7	1,432	51	40	38	38	98	5.9	5.2	11.5	7.6	3.7	2.2
8	1,370	57	45	43	44	102	6.8	6.1	13.1	8.9	4.1	2.7
9	412	59	47	45	47	108	6.9	6.4	13.7	9.5	4.1	3.1
10	216	57	45	43	46	112	7.2	6.7	14.0	9.5	4.1	3.1
11	151	59	47	44	48	114	7.9	7.4	14.4	9.4	4.5	3.3
12	169	61	48	44	49	112	7.7	7.2	14.9	10.8	4.6	3.6
13	462	71	56	50	56	116	8.6	8.2	16.8	12.6	5.3	4.0
14	131	74	51	58	59	124	9.7	9.1	17.2	11.8	5.4	4.1
	8,679†											

*S. A. Courtis, "Standard Scores in Arithmetic," *Elementary School Teacher*, November, 1911 pp. 127–37.

† Certain of the tests were omitted by several schools, thus materially reducing the average. For most of the tests, however, the total number of scores is over 9,000.

Mr. Courtis is of the opinion that the averages may represent approximate norms for the earlier grades. For the later grades, however, they probably are below what ought to be expected. Taking, therefore, the averages for the third grade as normal for the third grade, but for the eighth grade taking a speed rate such that 70 per cent of the pupils fall below it and 30 per cent rise above it, he plotted a smooth curve having the same general form as the average curve and coinciding with it in the lower grade. From this curve he calculated the probable

standard score for each of the grades between the third and the eighth. Table II represents his "standard scores." This table shows what in his opinion, based upon the averages, ought to be expected of each of the school grades in these eight kinds of mathematical operations.

TABLE II*

STANDARD SCORES

TEST NO.	No. 1	No. 2	NOS. 3 AND 4	No. 5	No. 6		No. 7		No. 8	
					Ats.	Rts.	Ats.	Rts.	Ats.	Rts.
Grade 3...	26	19	16	58	2.7	2.1	5.0	2.7	2.0	1.1
Grade 4...	34	25	23	72	3.7	3.0	7.0	3.3	2.6	1.7
Grade 5...	42	31	30	86	4.8	4.0	9.0	4.9	3.1	2.2
Grade 6...	50	38	37	99	5.8	5.0	11.0	6.6	3.7	2.8
Grade 7...	58	44	44	110	6.8	6.0	13.0	8.3	4.2	3.4
Grade 8...	63	49	49	117	7.8	7.0	14.4	10.0	4.8	4.0
Grade 9...	65	50	50	120	8.6	7.8	15.0	11.0	5.0	4.3

* Courtis, *op. cit.*, p. 135.

Translating this table into words: "At the end of a year's work, an eighth-grade child should be able to copy figures in pencil on paper at the rate of 117 figures per minute; to write answers to the multiplication combinations at the rate of 49 answers per minute; to read simple one-step problems of approximately 30 words in length and decide upon the operation to be used in their solution at the rate of 8 examples a minute with an accuracy of 90 per cent; to work abstract examples of approximately 10 figures (twice as many for addition) at the rate of 14.4 examples in 10 minutes with an accuracy of 70 per cent; to solve two-step problems of approximately 10 figures at the rate of 5 in 6 minutes with an accuracy of 75 per cent. At the present time 70 per cent of the eighth-grade children cannot meet these standards. But it must be borne in mind that 3 per cent of the fifth-grade children can, and that experience has shown that individual care and a very little, well-managed drill produces marked changes in the ability of most children."[1]

To translate the table into words in another way: In simple addition operations, the third-grade teacher should bring her pupils up to an average of 26 correct combinations per minute. The fourth-grade teacher has the task, during the year that the same pupils are under

[1] Courtis, *op. cit.*, p. 136.

her care, of increasing their addition speed from an average of 26 combinations per minute to an average of 34 combinations per minute. If she does not bring them up to the standard 34, she has failed to perform her duty in proportion to the deficit; and there is no responsibility upon her for carrying them beyond the standard of 34. Her task is simply to increase their addition rate from 26 to 34. The fifth-grade teacher is to take pupils with an average rate of 34 and bring up their speed to an average of 42, a perfectly definite task. The sixth-grade teacher is to take pupils with an average of 42 and to carry them before the end of the year to an average of 50 combinations per minute. The seventh-grade teacher increases their ability from 50 combinations to 58. The eighth-grade teacher takes them with 58 combinations to the minute and brings them up to 63, and the ninth-grade teacher is to add the small increment of 2 combinations per minute during the ninth grade. In like manner, in the case of each of the other operations, each teacher has his own special increment to add to the work of his predecessor before turning his partially finished product over to the next teacher in the series. This table of standard scores of Mr. Courtis shows us the ultimate standard that is to be attained at the end of the school course, and it also shows the progressive standards to be attained at each stage of the process from the beginning to the end. It gives us the two things required by the two principles of supervision stated at the heading of this chapter.

1. *Value to the teacher.*—Each teacher can know accurately what is expected of her. The sixth-grade teacher, for example, knows that, in the solution of a series of problems involving all of the fundamental operations, of the difficulty of the examples of scale No. 7, the pupils when they come to her from the fifth grade should be able, in a 12-minute test, to solve 11 of these problems with an accuracy of 60 per cent. She can therefore know in the beginning whether they are up to standard or not. She also knows definitely that it is her task to increase their ability in such degree that at the end of the year these same pupils will be able to solve 13 of these same problems in 12 minutes, with an accuracy of 64 per cent. If the standards are rightly placed she must not fall short of this, neither must the pupils go beyond it. The standard so set up is to be attained, neither more nor less. Her task is equally definite in the case of each of the other combinations in which the students are to be trained.

Having these definite tasks laid upon her, she can know at all times whether she is accomplishing the things expected of her or not. She can herself know whether she is a good teacher, a medium teacher, or a poor teacher. She can know when she needs help, and when she needs no help; when she needs to use better methods, and when she has found better methods. She can know how much time to give to any specific task. If the time allotted to her is limited, she can know whether within the time given she can bring thirty pupils to the standard required, or fifty pupils, or eighty. She can judge the efficacy of the books and appliances that are furnished her. The teacher is thus prepared to judge herself and all her methods and appliances. Being thus able to judge of her output, there is no chance of injustice being done her. She can be sure of receiving help in proportion to need, and recognition in proportion to merit.

The child becomes the center of her educational consciousness rather than the machinery of education. Her problem is no longer the mere turning of the machinery that is given her, letting it grind out whatever educational product happens to occur, good, bad, or indifferent. Her task is to turn out a product of a definite sort in the shape of developed abilities within the pupils. Manipulating the machinery of education then becomes the means and not the end. Her vision must be kept focused on the ends to be reached—the awakening of latencies into actualities within the pupils.

This putting of the educational product in the forefront of education means the establishment of a continuous record of progress in the case of each of the products. If in the case of addition, the standards are 26, 34, 42, 50, 58, 63, 65 successively, then for each particular pupil we must have in a parallel column the record actually attained by him for each of these successive stages of advance, to see whether he has kept up to standard, fallen below it, or advanced beyond it. Such a continuous record must be kept, naturally, in the case of each of the many score educational products so as to show how each pupil at any time measures up against the standard. Simpler than parallel columns of figures would be graphical representation, the only objection being the necessity of increased space and labor.

Graphical representation might be made as in the excellent condensed form presented by Mr. Courtis in his circulars and reproduced in Fig. 1.

The vertical columns represent the work that should be done by the various grades. The line representing the work done by a seventh-grade pupil, let us say, would, if the pupil's work was altogether normal, lie wholly in the seventh column. If the curve should move to the left into lower columns, it would indicate deficiency; if to the right into higher columns, it would indicate superiority in his work.

Another plan of graphical representation, requiring more space, is

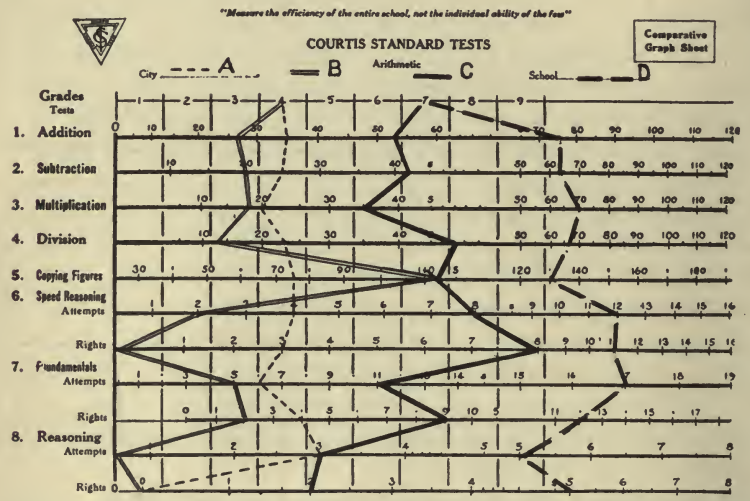


FIG. 1.—In the figure above curves A and B are of two individuals in the same class. From an Indiana school. Note that A is practically normal except in the last test (shown by the fact that the curve is almost a straight line and lies almost wholly within the boundaries of the fourth grade), while B is below grade in every test but one and is particularly weak on reasoning.

Curves C and D are two measurements of the same child, one in September and the other in June. From a Michigan school. Note the correction of many defects and the balance of the final scores.

(Cut presented through the kindness of Mr. Courtis.)

shown in Fig. 2. On the five records of pupils are placed dotted lines which represent the normal progressive standards for speed in solving the examples of scale number 7. The continuous lines represent the performances of five different students. The records show that evidently pupil No. 1 does normal work; the line of performance follows the line of expectation. With pupil No. 2, the line of performance is

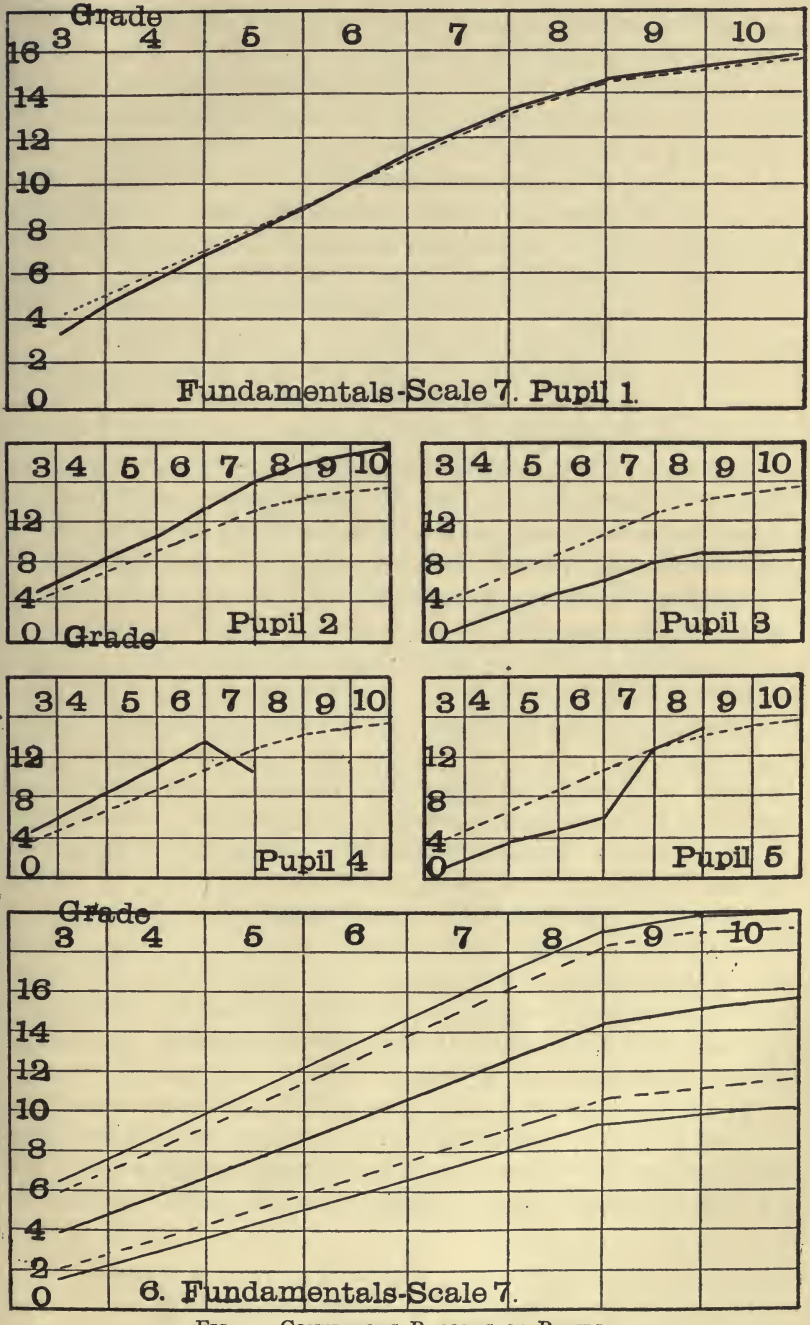


FIG. 2.—CONTINUOUS RECORDS OF PUPILS

much above the line of expectation; the pupil is evidently one of exceptional ability in this respect. Pupil No. 3 is obviously of low ability; his performance is uniformly and continuously below the standard expectation. Pupil No. 4 is evidently a bright pupil gone wrong for some reason or other that requires investigation and correction. Any sudden change in the line downward is naturally a call for help, and shows the teacher and supervisor where to focus their efforts. A continuous, apparently consistent record much below normal may likewise be a call for help. There may be some removable obstacle, continuously at work. Pupil No. 5 represents a pupil suffering from a removable difficulty. When the difficulty was removed, he rose to normal.

Evidently standards should be diverse according to native ability. For a pupil that starts off as pupil No. 2, the ultimate standard should be very different from the ultimate standard of a pupil who starts off like pupil No. 3; and the progressive standards should be correspondingly different. There ought certainly to be not less than three sets of standards for the varying native ability: one for the 60 or 80 per cent of pupils lying near the normal, another for the 10 or 20 per cent of pupils who have high ability, and a low standard for the 10 or 20 per cent of pupils who are much below the normal in ability. The pupil would select his own standard by his own performance. There could be absolutely nothing arbitrary about it. On record No. 6, in Fig. 2, three such standards are shown. The dotted lines might indicate divisions at such levels that 20 per cent of the pupils, if distributed according to the normal probability curve, would find themselves above the upper dotted line, and 20 per cent below the lower dotted line. Now in actual practice using this particular printed form as the basis of the graphs, any pupil whose record persistently fell below the lower dotted line might use the low standard of performance as his norm. Those whose records were between the two dotted lines might use the central normal line as their norm, while those whose records were above the upper dotted line would regard the higher series of standards as their norm. The pupil places himself, and for him to do so must necessarily be a healthy thing for him and for all concerned.

This differentiation of standards on the basis of native ability is closely related to the differentiation of standards according to vocational and social destiny. In the cases in question those pupils who fall into the lower 20 per cent and thus require a lower standard of performance

than the average must be prevented from entering any field of work that requires rapid, accurate, mathematical calculation, unless it can be proven that their inability is due to defect, and unless this defect is actually removed and they rise into the higher ranks of their classes. Pupils whose performance falls near the middle of the scale and whose standard is the one of mathematical mediocrity should be strongly urged not to undertake vocational labor that requires strenuous mathematical ability. This differentiation of standards and the letting of pupils find their place becomes then one of the strongest instruments in the hands of the schools in the matter of vocational guidance.

2. *Value to the supervisor.*—The building principal or supervisors of special subjects can tell by glancing over the continuous records of the pupils under any given teacher and comparing them with the standards set for pupils of those particular classes whether the teacher is securing the full results expected in the case of the different pupils, and whether in so doing she is handling the normal number of pupils. The teacher who falls short of this standard; or, when standards are reached, is able to bring only a small number of students up to these standards, is unmistakably shown to be a weak teacher. The one who can bring a large number of pupils up to the standard for those pupils in a minimum of time can be known instantly as a good teacher. A supervisor can thus know absolutely where he needs to give help and also where no help is required of him. Moreover, looking over the record of the students, the supervisor is apprised of just the thing in which a teacher appears to be deficient, and can not only know what teachers to help but in which particular department of that teacher's work he must give the most help and in which department the least.

These standards are not set up by the supervising principal himself, nor are they set up by the teacher. The standards represent common aims toward which both must strive. The success of both depends upon the ends being attained. Principal and teacher are thus put upon a common level. Neither exercises arbitrary authority over the other. It is a case of the stronger helping the weaker for the success of both; or perhaps better, a case of the specialist in one aspect of the work helping the specialist in an allied field of co-operative endeavor, for the good of both.

The supervising principal can further know whether the weak or indifferent teacher to whom he is giving advice and assistance of every

necessary sort is in fact making improvement; whether she is, in fact, taking advantage of the aid that is being given. He can know, from measuring the results of her work, whether to make more strenuous effort, or whether he can relax his efforts. He will then have incontestable evidence of inefficiency against the weak teacher who cannot or who refuses to improve. And the present-day difficulty of removing such a teacher from the service, transferring her, or retiring her, will be instantly overcome. The principal can also know when he has given enough help to the teacher, and when no further help is required.

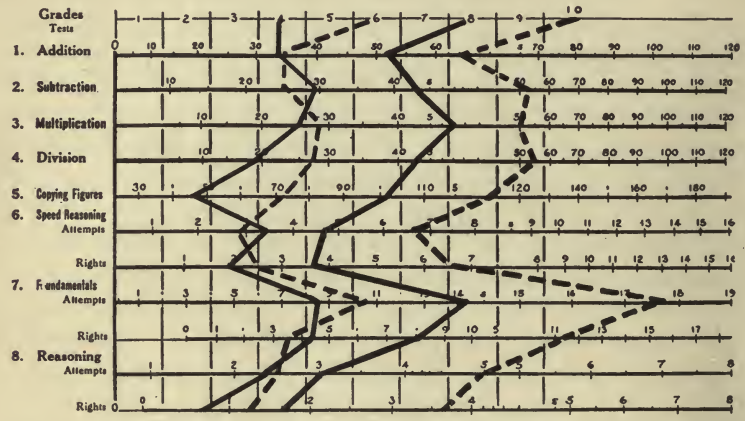


FIG. 3.—BALANCE OF COURSE OF STUDY. GRAPH OF GRADE AVERAGES.

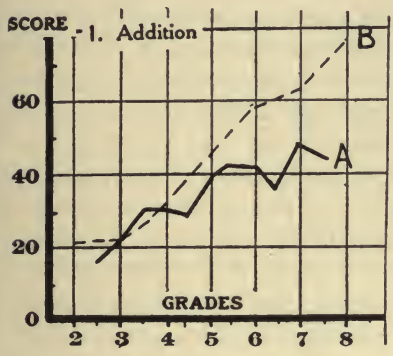
The curves show that the course of study emphasizes the abstract work at the expense of reasoning. A Virginia School.

(Cut loaned by Mr. Courtis.)

The principal can judge of the course of training given by all his teachers whether weak or strong. Fig. 3 pictures the situation in a school where the emphasis is very irregular. A principal, finding such weakness in arithmetical reasoning as the figure exhibits has pointed out to him in unmistakable terms just where readjustment in the course of study is needed.

When the principal can state the results of the efforts of his teachers in terms of definite measuring scales, it will be possible for him to compare the results obtained in his building with corresponding results of other buildings within the city. He can know whether the results of

the work of his building are high, medium, or low. He can know whether the methods which he sanctions are getting proper results as compared with methods used in other buildings. He can tell whether the books, appliances, and the distribution of the day's time are securing the results obtained in other buildings. At present it is practically impossible for one building principal to know how his work compares with the work of other buildings in the city. He has too little time for visiting, and when he does visit he has no accurate scales with which to measure the work so as to make the necessary comparisons. If he is reduced in rank by the superintendent, he feels that it is an exercise of arbitrary



A, poor supervision. Much variation from grade to grade and a low final score. From an actual school.

B, close supervision. Constant, steady growth from grade to grade and a high final product. From another school.

FIG. 4.—EFFICIENCY OF SUPERVISION

authority and that injustice has been done. If he sees another principal promoted to a higher rank, or promoted over his head, he feels again that it is an exercise of arbitrary authority and not primarily the reward of merit; and he feels again that injustice is being done. But when he can definitely know how the work of his building compares with the work of principals of other buildings, artibrary authority in his mind is replaced by absolute standards, and he can know whether it is merit that wins or not. Under these circumstances he can know that it is merit that wins; since merit will win when it is possible to measure merit.

With scales of measurement and standards of performance such as described, it is no longer possible for a principal to hide behind the plea that he has an inferior social class in his school, and, therefore, high performance should not be expected of him or of his teachers. The

differentiated standards for the bright, the normal, and the dull make allowance for this difference in the quality of the pupils' ability. It is a question of a principal's securing from his building a proper number of units of product of the standard that is naturally set by the nature and destiny of the pupils themselves. With standards rightly placed, the amount of effort required to lift a pupil from one stage to the next on the low level will be approximately equal to the amount of effort required to lift a student from one stage to another upon the higher level. It is a question of the quantity of units that result from the labor. The fact that the raw material is naturally poor is eliminated as a disturbing factor in the comparison of building with building.

3. *Value to the superintendent.*—The superintendent, by glancing over the number of units of results obtained by each teacher in each building in his city, especially when thrown into distribution tables and graphs, can locate instantly the strong, the mediocre, and the weak teachers. By noting the distribution by buildings, he can also see at a glance what building principals are doing a superior grade of work, what ones relatively poor work. Thus he is able to tell at once where his strong subordinates are and where his weak ones are. He can know with certainty the building principals and the teachers that are especially in need of help from the central office. It tells him where work is needed and the degree in which it is needed. It forms the only secure foundation on the basis of which to distribute his efforts so as to bring about within the system the greatest possible degree of efficiency. Without these definite facts, he gropes in the vague realm of general impressions. He cannot know with certainty where his help is most needed, nor can he know the degree in which it is needed.

With figures before him of the sort indicated, he can not only know what teachers are weak, but he can know in what particular topic they are weakest. Thus the expert help sent to these teachers can be of the sort from which they are able to profit most. There is no need of sending help to a generally weak teacher in the matter of tasks in which the teacher happens to be strong, and the work satisfactory. A scientific placing of the supervisor's efforts cannot be accomplished until we can accurately locate weakness with certainty.

With standards and scales of measurement, the superintendent will be in a position to measure the relative values of different methods, different textbooks, different amounts of time given to a topic, and the

like. At present it is not considered safe to experiment in a public-school system in any great degree because of the great difficulty of knowing when things are going wrong in time to prevent harm being done the pupils. But when definite measurement is possible, the workers cannot be kept long in doubt as to whether a given method or a given textbook is securing the requisite results. The superintendent can test out two given methods of teaching a topic, for instance. In one building some reliable teacher uses the one method, in another building another reliable teacher uses another method. The results of the different methods can be measured by scales and secure judgment made as to which is the superior. Where difference is pronounced, the poorer method can be discarded, the better method standardized for all the schools. In judging textbooks likewise, one kind of book can be used in certain buildings and another kind of book used in other buildings. Results can be compared one with another and measured. It can be definitely known which of the books is the superior, and the poorer one can be discarded. Textbook companies can be forced to expend the whole of their competitive energies in improving the qualities of their books.

The superintendent will also have for the first time the ability to compare the work of the schools within his city with the work of schools in other cities. The plan has already been introduced into the field of educational finance, where it is much easier to define items to be measured, and where the scale of measurement lies ready at hand in our money system. The Bulletin of the U.S. Bureau of Education by Mr. Updegraff, entitled *A Study of Expenses of City School Systems*, shows the method and the possibilities of such comparisons.

With these standards, a superintendent can judge himself. He can know whether the results obtained in his city are superior, inferior, or mediocre. He can see the size of the task that he must undertake with his principals and teachers in order to bring his city up to standard requirements. He can bring the board to see the nature of the problem, and this will tend at least to stimulate them to furnish the necessary equipment, supplies, and teaching power to accomplish the task. Moreover, he can bring the community to see the relative deficiency of results in their city and can stimulate public opinion, in a manner the most effective, toward better school support and co-operation. He has unanswerable arguments on the basis of which to urge improvement in the quality of teachers, in the quality of books, in the quality of

buildings, in the size of classes, in methods employed by the teachers, and every other thing that makes for increased efficiency. He can talk a language that can be understood by the community. The isolation of the school, which is at the present time the greatest obstacle to improvement from within and the greatest obstacle to community understanding and co-operation from without, can be overcome when teachers, parents, school boards, business men, can discuss results in specific understandable terms. Such is not possible at the present moment. To create this common language and common basis of understanding between school and community must of necessity be one of the greatest of the values to be derived from the establishment of standards and of scales of measurement for the various educational products.

4. *Value to the student.*—Prehaps it may here be objected that the effect of standards of achievement upon the pupil is a teaching problem rather than a supervisory problem. As a matter of fact, however, looking at a school system as a large organization of individuals for the purpose of turning out certain necessary human products, the pupils are in fact the ultimate workers. They are the rank and file over whom the teachers stand in supervisory capacity. The work is a development of the potential abilities which the pupils carry around within themselves into actual abilities of a given degree. These actual abilities are the educational products. It is the work of the student, not the work of the teacher, that produces these products. The teacher is supervisor, director, guide, stimulator, of the rank and file of the workers in order to bring about on the part of the latter the development of these various abilities. The teaching problem is in fact a supervisory problem at the first level.

With standards of addition, subtraction, multiplication, and the rest before him, this ultimate worker, the pupil, can know definitely what is expected of him. The teaching problem is then to teach the pupil how to study, and properly to adjust stimulations so as to produce the desired effort. A tremendous amount of effort on the part of the teacher now expended in carrying the student along passsively on his back can be dispensed with; the student can be made to walk and bear his own burdens with this own strength and gain further strength thereby. Time can be gained for pupils and for teachers which can be expended more profitably.

It is unfortunate for our discussion that we must in such large

measure employ the future tense. Enough has already been done by Courtis, Thorndike, Ayres, Freeman, Wilson, Bliss, Hillegas, and many others, in these matters, to justify all these statements when taken qualitatively. It is yet too early, however, to make even quantitative estimates. We can be sure that, when the pupil knows what he should do, and when the teacher knows the best methods of stimulating him, efficiency in the work of the pupil will be increased. Wilson and Bliss present a few figures showing large improvement. We cannot say, however, whether the increase will be 50 per cent or 200 per cent. Probably the figures will be large when matters have been worked out.

Although the work of Mr. Courtis represents the most advanced work of its kind in the field at present, yet it is but the beginning of the task of setting up practical standards of arithmetical ability. His standards are based upon the average of pupils in the schools as they are. It is to assume that what we are doing is about right, the task of setting standards being but a putting into definite terms of things that are otherwise indefinite.

Now as a matter of fact, the average performance of our schools may or may not be closely related to the thing that we ought to do. If we were to determine the standards for the teaching of agriculture on the basis of the average amount of work that is now done and the average standard that is now reached, it is probable that our standards would be very far below those that ought at present to be set up. If we take the average performance of high-school girls in algebra and use this as the basis for a determination of proper standards for algebra, it is probable that our requirements would be much higher than the actual needs of girls in the matter of algebra. What the schools are doing cannot be used as the sole basis for establishing the ultimate standards of performance. Neither can it be used as the basis for establishing the progressive standards. It assumes that the work of the schools is right and on the basis of this establishes standards, when, as a matter of fact, we must first establish our standards before we can even so much as judge as to the rightness of school work.

Where then are standards to be found? Recurring to our illustration at the beginning of this chapter, it was noted that standard dimensions and qualities of steel rails are not determined by those who are engaged in the manufacture of steel rails, but by those of the transportation world who use the product of the steel plant. Now the relation of

the school system to the various departments of the world's activity is exactly the same as the relation of the steel plant to the transportation industry. Each department of the world's affairs demands of the schools educational products of the kinds needed by this particular department. Now taking mathematical ability, since that is the product under discussion here, the commercial world is demanding of us standards of one sort; the world of mechanical industry places other kinds of requirements upon the schools, and the need for different standards; the home-keeping vocations of women demand still other standards of mathematical ability. It is the need of the world of affairs that determines the standard specifications for the educational product. A school system can no more find standards of performance within itself than a steel plant can find the proper height or weight per yard for steel rails from the activities within the plant.

Take the case of a man who builds a house with the aid of a contractor. It is for the man to specify in definite terms what he wants. Suppose, however, the man says to his agent, "Here are $5,000; build me a house." Nothing is set down for the agent to live up to in the way of quality of materials, quality of workmanship, or plans. The agent is left to self-interest and his own ideas. It is probable that neither the one nor the other will bring about a result satisfactory to the principal to the transaction. An unsatisfactory result is practically inevitable. The principal, however, cannot justly blame his agent for not giving satisfaction. His agent was not properly provided with instructions as to what to do, or with necessary limitations as to what he must not do. Now when the general society as principal says to the school as its agent: "Here are $35 for each pupil sent to you; take it and educate them." The agent in this case is as helpless and as irresponsible, necessarily, as in the other case. Positive instructions are not given; limitations are not set. He, too, is free to follow self-interest and his own ideas. Satisfactory results are not probable. The principal, however —society in this case—can have no just grounds for complaint. It did not properly instruct its agents.

It may be said that general society speaking through its representatives has specified the work to be done. It has said that we must teach reading, spelling, writing, composition, arithmetic, geography, history, hygiene, elementary science, and manual activities. So it has; but even if it had not, the school would be doing these things, anyway. Their

instructing the school in terms more general than the actual arrangements of the school already provide does not accomplish the purpose. It is altogether too general, too indefinite. It is much the same as if the principal to the building transaction should say to his contractor when asked for instructions: "Oh! Make a dozen windows, a dozen doors, six or eight rooms, a roof, some partitions, and a stair." Whatever design the contractor should draw up, or whatever materials he should use, he would make these things, anyway; and his principal's giving instructions in such general terms is of no more service than if he gave no instructions at all. Instructions on every point must be definite; the exact arrangement of every room, door, window, wall, in fact, every element in the building, exact to a fraction of an inch, must be exactly stated. Nothing less will serve. Now in the case of the instructions of our general society to its agent, the school, specifications must be equally definite. This principle is fundamental. We are scarcely prepared to take any step forward in education until we have taken this step.

A school system is one of the world's practical productive concerns. A railroad, for example, not only requires steel but it requires steel that is fashioned into a shape that can be used—rails, locomotives, cars. For its operatives, it requires not merely men, but men whose abilities have been shaped into the fashion that can be used most effectively. Now it is the business of the factory management to furnish the material appliances in their proper forms. It is equally the business of the educational management to furnish the abilities of the operatives in the proper forms. The standards must of necessity be determined and stated, in the one case as well as in the other, by those that use the product, not by those who produce it. Standards of addition, subtraction, or other mathematical operation, can be determined only by the needs of that department of human affairs where that ability is to be used. Standards are to be found in the world of affairs, not in the schools.

The determination of standards on the basis of the averages of the work actually done in our schools is to establish, for the most part, the same standards for all classes of pupils. The world of affairs, however, lays very different requirements upon different classes of its workers, and therefore, in the case of each, lays different requirements on the school as to the educational products. If standards are adjusted to needs—and they must be—then in these matters of mathematical speed and mathematical accuracy, we must have a different set of standards for

each of a number of vocational classes. The requirement for some will be high; for others, it will be low. In the matter of algebra, for example, some forms of labor would set up high standards of requirement; others would make no requirements at all.

Before we can have scientific supervision in education, of the efficient sort already to be found in the best portions of the business world, it will be necessary to make careful surveys of community needs, on the basis of which to determine the necessary standards. These surveys should be made, not by school people, but in each department of human affairs by those who are most familiar with its needs. The commercial world can best say what it needs in the case of its stenographers and accountants. A machine shop can best say what is needed in the workers that come to it. The plumbing trade contains the men who are best able to state the needs of those entering upon plumbing; and so on through the entire list. If the various departments of the business world could thus state in specific terms the kind of educational product that it desires in the workers that come to it, it would be performing a far more valuable service than the present method of complaining that the schools are not turning out what they want, when, as a matter of fact, they have never told the schools exactly what they do want. The schools are in the position of the steel plant that receives the order from the railroad: "Make us some steel rails." Such a railroad need not expect to be satisfied with what it gets. Its specifications are too vague. Neither can the world expect to get a good product from our school systems until it defines what it needs in specific terms.

Although the burden for the determination of the ultimate standards for educational products lies rightly and necessarily upon the various departments of the general society of which the educational organization is but an agent, still the school systems cannot stand idly by and passively wait until these various departments of practical affairs present their statements as to their educational needs. These various departments of affairs require active and vigorous leadership for their educational thought; and they require large quantities of expert information and advice. In general, they do not understand in clear terms their relations to public-school education; they do not clearly appreciate the responsibility that lies upon them for definitely saying what they want. On the other hand, they do not know the possibilities of improving public-school education by absolving their portion of educational responsibility.

In general, when they want a thing done better than the public schools are doing it, they desire to set up a special system of schools, looking upon public education as hopeless. Simply they do not know how to use their agent so as to get the things they need.

The responsibility probably lies upon those who direct educational affairs to make clear to the various departments of human activity this relationship, and the necessary division of responsibilities. The method of making this relationship clear is probably not to give these various organizations and classes of men good advice as to what they should do. A better way probably is to set on foot the actual practical work of determining in co-operative fashion the particular standards of speed and accuracy for the various desirable mathematical operations needed. The growing complaint as to the inefficiency of our public-school education, the growing insistence that new kinds of schools be established for giving the kind of training that the world can use, the insistence that there be advisory boards drawn from the various departments of affairs directly concerned—all these things show a vague awareness of the relationship that should exist between the practical world and the department that supplies ability for the use of this practical world. The world thus proves itself ready for the leadership and for the co-operative tasks here outlined.

The case is different, however, as to the progressive standards that will lead ultimately to these final standards. After society has given to the school its ultimate standard in any particular case, it then is certainly the business of the educational and psychological experts to determine the time of beginning, the intensity of the work, and the standards to be attained in each of the successive stages.

The standards for the educational product required by the first principle stated at the head of this section must necessarily be socially determined by matters that lie outside of the school system. The progressive standards required by the second principle must be psychologically and experimentally determined by expert educational workers within the school system itself. This is a special professional problem requiring scientific investigation of a highly technical sort. It is a field of work in which the untrained layman can have no opinion and in which he has no right to interfere. Society is to say what shall be accomplished in the ultimate education of each class of individuals. Only the specialist can determine how it is to be done.

Mr. Courtis does not claim that his "standard scores" are final, nor that the ultimate standards are determined on the proper basis. He is doing pioneer work, and all that he claims is that the standard permits the rendering definite of educational ends that are now vague, inchoate, indefinite. It means also the setting-up of standards that are superior to those of most of our schools at the present time—standards, too, that are possible as shown by the fact that they have been attained and frequently surpassed by a number of schools tested. His work shows progressive standards that are both actual and possible in a good school system. His scales for the eight operations are the best that have yet been devised for measuring these forms of work. While his work has only begun, it has gone far enough to point clearly to the long program of investigation that lies before us. It has gone far enough also to show that the existence of standards must lie at the foundation of scientific direction and supervision of educational affairs.

So much time has been given to the Courtis standards and scales of measurement because of their definiteness and completeness, so far as they carry the work. Probably the entire subject of public-school mathematics will be the easiest subject in which to develop ultimate and progressive standards, together with scales of measurement. By developing the easiest field first we shall acquire the technique and the experience that will permit the solution of the progressively more and more difficult tasks presented by the more intangible portions of education.

Another subject in which standards might be determined with relative ease is spelling. Although much good work has recently been done in this field on the side of methods by Pearson, Wallin, and Suzzallo, yet so far as I am aware, little has been done in the way of determining standards. It is usually assumed that pupils are to be brought up to a standard of absolute perfection in spelling. Determinations have not been made as to the range of words to be covered on the basis of this standard.

Now it is probable that there is a list of words which, for any given class of students, ought to be spelled by them with an accuracy of 100 per cent. There probably is another list to be determined in which an accuracy of 98 per cent should be the standard; a third list, in which the accuracy might be 96 per cent; and a fourth list, 94 per cent. There is probably, for any given class of people, a list of words used so very

rarely, and which are relatively so difficult that an accuracy standard of 75 per cent would be high enough; and another list in which an accuracy of 50 per cent would be sufficiently high.

Moreover, it is also reasonably certain that standards of accuracy should be different for different social and vocational classes. For the stenographer, proofreader, or telegrapher, the standard of accuracy should be very high for a very large list of words; whereas, for the plumber, the carpenter, or the farmer, the standards of accuracy might well be considerably lower, and the range of words covered considerably narrower.

Now what, for example, are the words that the world of affairs requires the stenographer to spell with an accuracy of 100 per cent? What is the list of words in which she may be permitted an accuracy of only 98 per cent? And in like manner, what should be required for each of the progressively less accurate lists? Obviously this is not a thing that the school can of itself determine. It is for the business world to say what these lists are. The task of determining the lists will be naturally a co-operative one, of school workers and business workers, as described in the discussion of mathematical standards.

After these ultimate standards are set up for the training of stenographers, the rest of the task is an expert educational one with which the outside world has nothing to do. It is the determination of the various progressive standards that should be reached at each stage of advance from the beginning of the teaching until the attainment of the ultimate standard; the determination of methods of work, of textbooks, of relative times, and the control of many other factors. The lists of words themselves together with the percentage scale constitute the scale of measurement.

With such standards, the prospective stenographer can know exactly what is expected of her in the way of spelling. The teacher can know exactly what is expected. The principal can know what is expected; and so on throughout the entire supervisory line. Moreover, proper tests can show at periodic intervals whether the standards are being attained.

Commercial courses in our high schools cannot then be accused by business men, as they are now accused in authoritative reports, of turning out stenographers who cannot properly spell. They will not be turned out until they can spell. Length of courses will then be deter-

mined, not by the calendar, but by the time it takes to finish the product up to standard. At present, the chief difficulty is that in such courses there are no standards to work to. Schools are simply grinding away without any goal in view. They move in the right direction; they may move in the wrong direction. Without a goal their efforts are relatively random, feeble, inefficient. The pupil does not know what to aim at; the teacher does not know how much to require; the principal does not know how high the teacher is aiming; the superintendent has no means of knowing the standards of either teacher or principal. The whole situation represents the jellyfish stage of organization and direction.

The desirable list of words, and the varying standards of accuracy for the lists would have to be determined in the same manner for the training in spelling for each of the large social and vocational classes. And as in the arithmetic tests, we shall again, naturally, need different standards for those of low, mediocre, and high natural ability, each pupil choosing the standard, not arbitrarily, but by the nature of the work that he does. Progress can be recorded graphically in the same fashion previously described for the arithmetic operations. His standing here again would be significant for vocational guidance. Individuals whose native aptitude kept them along the line of the lower standard would certainly be kept out of the vocation of stenographer, or newspaper compositor, or telegrapher. When such standards have been created, supervision of training in spelling is possible; without standards of some sort, there can be relatively little supervision, in fact.

In this field of spelling we have neither tentative standards such as those that Courtis gives us for arithmetic, nor any tentative scale of measurement. The few lists of words that have been used by the expert spelling investigators are altogether too brief; and their relative position in any scale altogether too indefinite to serve the purpose of standard scales of measurement. For simple comparative tests of the work of city with city, or school with school, they serve a very useful purpose and look definitely in the direction of assured progress. The work needs to be continued until we have standards that can be of permanent worth. Such standards would certainly not be unchanging. They would change as determinative technique improved and they would change with social conditions. But that even change be rational, there must be something relatively permanent to be changed.

Handwriting has made rather more progress. We have here two

good scales of quality, one by Thorndike, one by Ayres, both scientifically constructed, but on rather different bases. The speed scale is the number of letters that can be written per minute. On the bases both of quality and of speed we have already tentative standards, for the various school grades. The following table shows the standards that have been arrived at tentatively by Dr. Freeman and Superintendent Wilson:

School Grade	Speed		Quality	
	Wilson	Freeman	Wilson (Thorndike scale)	Freeman (Ayres scale)
1A	12–16	20	8–10	35
2B	15–20	30	8–12	40
2A	15–25	40	9–12	
3B	15–30	50	9–12	50
3A	25–40		9.5–13	
4B	30–55	60	10–13.3	50
4A	40–65		10–13.6	
5	45–65	70	10–14	55
6	50–70	80	11–14	60
7	50–75	90	11–14.5	65
8	55–75	100	12–15	70
9th year	55–85	...	12–16	..
10th year	60–85	...	12–16	..
11th and 12th years	65–100	...	12–16	..
Comm. high school	65–100	...	13–18	..

These standards are drawn up on the basis of average attainments in schools as they now train in handwriting; they are not based upon the actual needs of men. The setting-up of standards, such as presented in the table, both ultimate and progressive, based upon the work within the school system itself, is naturally an enormous step in advance of present conditions; and the possession of such standards creates the possibility of supervision of the teaching of this subject. Such standards have most of the supervisory value of standards determined from an analysis of human needs. They are not so convincing, however, to students or to teachers; and probably have not the same stimulating qualities. They probably cannot be so serviceable in the co-operation of school and community in matters of stimulating effort on the part of the pupils.

The ultimate standard to be attained in handwriting cannot be determined from anything to be found within the school. These

ultimate standards can only be found in the world of affairs. And the standards will necessarily differ from social class to social class. Standards for commercial workers will have to be much higher than for literary workers. Standards for the latter need to be higher than for blacksmiths and carpenters and farmers and men who have relatively little writing to do. The ultimate standards for commercial workers should probably not be so high as was demanded ten years ago, or thirty years ago, owing to the introduction of machines for writing. Final decision of the question can be made only by the commercial world. Having the ultimate standards for each particular class, it is the special function of the expert workers to determine the progressive standards and general procedure for accomplishing the training. Here laymen can have nothing to say.

Within recent months Thorndike and Hillegas have given us a tentative scale for measuring merit in English composition. Such a scale is necessary before we can have the terms in which to define actual standards, ultimate and progressive. Just as the invention of the foot-ruler or some analogous linear measure is necessary before we can have absolute standards for the manufacture of steel rails, so in composition ability we must have definite scales of measurement established before we can set up the standards to aim at in the shaping of the product. This scale of Thorndike and Hillegas is only a scale of measurement however. There is nothing in the scale itself to say what the standards of attainment shall be. This is a matter to be determined by the needs of men. What composition ability, let us ask, is needed by men and women in each of the various walks of human life? To what standards of merit as shown by the scale of measurement is each of these classes to be brought during their training? The answer is not to be found within the school. Let educators, social workers, and plumbers get together and determine the standards for the plumber. Let farmers, social workers, and educators get together and determine the standards for the farmer. Let newspaper men and educators determine what the standards shall be for prospective journalists. The labor needs to be extended through a long list.

The scale for measuring merit in composition appears to be a more difficult thing to devise than the scales for the other subjects discussed. Several factors enter in, such as handwriting, sentence structure, spelling, rhetorical arrangement, together with the general spirit of the

thought content. Then again there are different varieties of prose composition—description, narration, and the like. It is possible, before the task of establishing standards can be accomplished, that we shall have to devise a number of measuring scales, one for each of the aspects of a composition, and one for each of the different varieties of composition. Thorndike and Hillegas have pointed the way and shown the possibilities. The large co-operative task lies upon all of us to take their suggestions and carry through the various necessary investigations to their ultimate completion. It will mean a slight increase in our work for the moment. It will mean a tremendous economy of labor and time and expense in the end. The task is inescapable; and the sooner done, the better.

In these simple fields it appears possible to determine scales of measurement, and to set up standards. Is it possible to make such determinations for all aspects of school work? It seems possible in the case of studies and exercises that involve objective activity or expression. Thus it appears possible in reading, drawing, translation of foreign languages, grammatical analysis of sentences, music, the various manual activities, sewing, woodwork, embroidery, printing, bookbinding, together with the entire field of physical development, strength, endurance, nutrition, vital capacity, weight, and height.

On the other hand, the teaching of science, history, and literature has such intangible aims as width of mental horizon, depth and fulness of appreciation, accuracy of judgment, and right social and moral attitudes. Here at first glance it appears impossible to set up definite scales of progress of a quantitative sort, in terms of which to state and to measure standards of attainment. In the case of each of these, however, it is possible to secure an objective expression of one sort or another. Usually in each case it is possible to secure a number of kinds of expression which may be used as bases for the formulation of scales of measurement in terms of which standards can be expressed. Since we are beginning naturally with the simpler matters, these more complicated ones lie some distance in the future and it is probable as technique develops and as we become familiar with the work these more intangible matters may present less difficulty when we reach them. It seems possible to determine scales of measurement and standards, both ultimate and progressive, with an accuracy sufficient for all practical directive and supervisory purposes for every desirable educational prod-

uct, whether tangible or intangible. We have standards at present, in fact, for every educational product. Our problem is simply the replacement of vague, indefinite estimation with more exact methods of measurement, and the substitution of definite standards of attainment for the uncertain, fluctuating ones now used. Since the scales and standards are here more difficult, these problems may well wait until we have developed technique and skill on lower, easier levels. After our profession has scaled the lower heights, it will be time enough to prepare to scale the higher.

The higher, however, must be scaled. However difficult it may seem to set up quantitative standards in the more intangible fields, it must of necessity be done, if once they are introduced into the lower more objective and more mechanical forms of training. It will work harm to establish definite standards for only a portion of the tasks of education, leaving the rest to the traditional vagueness and uncertainty of aim. In any school where accurate standards of mathematics, penmanship, composition, and spelling are established and enforced, but where all the rest of the work is left to the usual chance, teachers know that they can be and that they will be more definitely measured and judged in these standardized subjects than in anything else. The result is therefore, necessarily, overemphasis upon the simpler more mechanical subjects and relative neglect of the other and, on the whole, more important subjects. The work becomes mechanized not because of standards, but because standards have been established only in the mechanical aspects of the work. The things that are mechanical receive, under such conditions, more than their share of emphasis. This result is not, however, an argument against the presence of standards where they exist. It is rather an argument against the lack of standards in fields where they do not exist. The remedy is to establish equally definite standards in every field of educational labor. There can be no other remedy.

This very difficulty is one of the incontestable proofs of the relative superiority of the work with standards in stimulating teachers, supervisors, and pupils. The standardized matters get the time and the labor, and the unstandardized portions of the field are the ones neglected. But education must take care of all desirable aspects of human personality, training and developing each in due proportion, slighting nothing, neglecting nothing, giving unduly large or unduly small attention to nothing. Therefore if standards of attainment are set up in any part

of the educational field, they must of necessity be set up in all portions of the educational field.

Efficient *methods* are dependent on definite standards. So long as definite standards are lacking, we cannot expect methods to grow efficient. One does not devise expert methods of hitting a mark, nor does he exert himself strenuously in the effort, until he has some mark to hit. So long as his task is a mere firing in the air, almost any method will do. But the moment a specific mark is set for him, he must discriminatingly discard everything useless or relatively ineffective and must equally discriminatingly choose methods that are relatively efficacious in securing the end in view.

We do not exert ourselves to discover effective methods without some such incentive, nor to adopt them even after they are discovered. The unfortunately more or less isolated experimentation in our universities has definitely proven in a number of cases that in a given subject one method is very superior to another method. Yet, in practical schoolroom procedure, the two methods can, throughout the country, be found side by side, with the majority seemingly unconcerned and making little effort to apply information that has definitely been proven. The dearth of investigative results in our universities is certainly in part owing to the apathy with which the results are received by the practical educational world. There is little incentive for producing a thing if there is no call for it. The apathy in the practical educational world is probably more than anything else due to a lack of definite standards. When we have a specific mark to aim at and are judged to have failed in our efforts if we do not hit that mark, an incentive will have been thrown into the educational world that will no less than revolutionize its attitude toward scientific procedure.

Who should test the results? It is probable that they should be tested by workers all along the line, some for one purpose, some for another, the efforts of each serving as a check and a corrective for the others. If the eighth-grade standard for speed in multiplication is 50 operations per minute, it ought to be possible for the pupil himself to test his speed ability whenever he likes to see if he has attained the standard that has been set for him. He has thus a check upon the tests made by the teacher, as well as a number of other desirable things. The teacher, certainly, should be able and should test her pupils in every thing in which she trains them. This is necessary in order that she know

whether she is securing the standard product, falling below, or going beyond what is expected of her. It is a check also upon the supervisory tests. Injustice cannot be done her by the latter tests, if she has a check upon it. The building principal will necessarily occasionally make tests upon the pupils in order to locate strong and weak teachers, or strong and weak teaching in any subject. He needs the tests also in order that he may compare his work with that of other buildings in the city, his tests serving as a check upon injustice being done him by higher supervisory tests from the office of the city superintendent.

Tests will also be made by representatives of the superintendent; over these, the building principal will have no control. It is an accepted principle in the business world that the department which inspects the product must be wholly independent of the department which is responsible for securing the product. It is possible that the greater probity of building principals and teachers over that of corresponding workers in a business organization will render this principle somewhat less necessary in the educational field. The superintendent can in larger measure accept the results of tests given by principals and by teachers. But as the results of these tests come to determine the efficiency mark of teachers and principals; as they come to determine the salaries of the workers, together with other immunities and privileges, it will probably be necessary to reinforce this probity by independent tests from the superintendent's office after the plan of the inspector's department in the business world. But a superintendent who wanted to make good with a discerning community might very well manipulate results so as to make them more favorable than conditions warrant. It appears, therefore, that those who set aside the school organization as their agent might very well have an inspectorial department for independent testing of the work of their institutional agent.

An objection that will be made to this basis of scientific direction and supervision is that the requirements in the way of continuous records for each pupil are so great as to make the task impracticable if not impossible. Speed in addition requires one record, accuracy another; speed in subtraction a third, accuracy a fourth; and so on through the various forms of computation. Quality of handwriting demands a record for itself; speed of writing demands another. Accuracy in the spelling of one large list of words must have an individual record; accuracy of spelling another list, a second record; a third list must have

a third record; and so on. This series of records needed seems to extend throughout the whole realm of education, there being one continuous record for each educational product. It looks as though it would require a small ledger for each individual pupil to record his progress in developing each of his various necessary abilities. It looks like a large problem. Are the educational products worthy of the labor of keeping track of them?

This keeping of a continuous record of the results of labor is a commonplace in the business world. There, for example, the record follows each lot of goods through the factory from the time the raw material is received to the time it is finally disposed of in the shape of a finished, inspected, standard product. The principle is religiously followed in all successful commercial and transportation establishments. The business world knows that it cannot afford to neglect this function. It involves an elaborate system of accounting, but the business world has proven that the extra labor and expense is economically justifiable many times over by the saving and economy in the handling of the product. It is an indispensable basis for efficient management, direction, and supervision. Business efficiency would be destroyed if it were dispensed with.

I am unable to see any reason why we have less need of such continuous records in the development of a hundred related intangible products, the labor covering ten or fifteen years, than does the business world in the handling of goods of a relatively simple nature which remain in their hands but a comparatively short time. Where the processes are complicated, and efficiency in the result difficult to determine, and where the process covers a long period of years, the necessity for a careful continuous record is much greater than in the other case. It is probable therefore that education requires an even more elaborate system of accounting than is required by a factory or a railroad. It is probable that with us, as with all other organizations, ample and accurate information is the only possible foundation for successful management. Although such records will require an increased amount of labor for somebody, yet there is no reason that I am able to see why every advantage that accrues to the business world from the careful keeping of continuous records, would not also accrue in equal measure or in even greater measure to the educational world. When 10 per cent in increase of clerical labor means 100 per cent increased profit for an

organization, clearly the extra clerical labor required for efficient direction and control is altogether justifiable. We have every reason to think that increased results in education would equally justify the increased expenditure.

It must be remembered, however, that these continuous records cover a period of from ten to fifteen years. During a considerable portion of this period the pupil himself can do much of the labor. Moreover, in the training of clerical workers in our schools, the lack of live clerical work of a useful sort for giving them practice is one of the great deficiencies. This work might well eliminate a portion of this dearth of material. The saving in teaching labor required that is affected by the one matter of continuous records will perhaps be very much greater than the increased amount of labor necessary to make the records. Within a few years we can quote the quantitative results of actual experience, we hope, instead of being compelled in this humiliating fashion merely to make deductive applications of the principle to our field on the basis of the way it works among other organizations whose efficiency is so far in advance of that of our own.

A good deal of work is being done at the present time in the standardization of the various classes of educational costs. Although this is a bit beside our purpose, in this paper, yet it further illustrates the need of standards on the training side to serve as bases for standardizing costs in the field of physical administration. The method of drawing the deadly parallel between schools within the same city or between schools within different cities in the matter of the costs per pupil in each of the various items of educational expenditures is a long step forward. Of itself, even under present conditions, it means great improvements in methods of placing educational money, in economy, and in efficiency. Still it is but one step in the direction of effective procedure. As a matter of fact, there are so many factors entering into each of the items of expenditure as tabulated at present that it is practically impossible to make anything more than the most general sort of comparison. If we refer to Mr. Updegraff's study of *Expenses of City School Systems*, we find, for example, that among cities with a population of over 30,000, the cost per pupil of the salaries of teachers ranges from $9 to $36, the mean cost being about $16 and the middle 50 per cent range being from $14 to $19. The presumption is that a city that finds its cost within this middle range can feel itself reasonably safe in its

standard of expenditures while those that exceed $19 or fall below $14 are expending either not enough or too much per capita. Now, as a matter of fact, if a school expends $26 per pupil for teaching and secures twice the results obtained by a school expending $15 per pupil, the expensive school is, in fact, the more economical of the two. And of two schools near each other in the middle zone of safety, one may be securing a high quantity of results, and another a low quantity. One may, in fact, be securing a product that is inferior to other schools more efficiently managed that lie altogether below the lower limit of the zone of safety. We cannot standardize teaching costs until we standardize teaching product. The school that secures the greatest amount of product for the money expended is the most economical school whether it lies above the zone of safety or below it in the matter of actual expenditures as shown in Mr. Updegraff's tables. The present rapid progress, therefore, which is being made in the field of educational financial accounting is, from its side, going to demand that the unit of product be defined in terms sufficiently accurate to permit comparative cost calculations between schools in the same city and between schools of different cities.

To summarize these matters: (1) As a foundation for all scientific direction and supervision of labor in the field of education, we need first to draw up in detail for each social or vocational class of students in our charge a list of all of the abilities and aspects of personality for the training of which the school is responsible. (2) Next we need to determine scales of measurement in terms of which these many different aspects of the personality can be measured. (3) We must determine the amount of training that is socially desirable for each of these different abilities and state these amounts in terms of the scales of measurement. (4) We must have progressive standards of attainment for each stage of advance in the normal development of each ability in question. When these four sets of things are at hand for each differentiated social or vocational class, then we shall have for the first time a scientific curriculum for education worthy of our present age of science.

In my opinion, the formulation and development of some such program, completed and corrected by the co-operative work of the many viewpoints to be found among progressive workers, constitutes the most practical single task at present before the field of education. It points to a goal of administrative efficiency as far above the present as scientific

management in the business world is above the ordinary crude, empirical management. The greatest obstacle appears to be, not the complexity of the problems, nor the lack of technique, but rather the inability of school people to co-operate and the lack of a desire to co-operate. Owing to the nature of the training, the nature of the weeding process along the line, and the nature of the work to be performed, the school man is necessarily an intellectualist; and the intellectualist is, by nature, whatever the field of his labor, an independent individualist, a man of wide vision and of large capacity for self-help and self-direction. By nature he is a leader of men. He dislikes nothing so much as to sink his personality into a co-operative task where he is not the leader or director. Impatient of restraint for himself, he is sympathetically impatient of restraint for his colleagues. Each educational worker desires therefore for himself and for all others in the field of education the greatest possible degree of individualistic freedom. The result is, in city school systems, in normal schools, and in our universities, the relative autonomy of a very large number of small units—in other words, a low and primitive form of organization, direction, and management. All this stands in the way of accomplishing any large co-operative task. It results in a constitutional tendency to place the welfare of the worker above the welfare of the organization, and the welfare of both above the welfare of the total society of which school men and school institutions are but agents.

The program of work herein described, however, appears to be a co-operative task that will require the efforts of thousands of workers in the field, elementary, secondary, normal school, collegiate, and university. It is a task that will require some sacrifice, some setting of social service above personal or professional self-interest. Its accomplishment is inevitable; the major obstacle mentioned can only make delay. The ideal of social service is rapidly becoming the corner-stone of faith in every department of human affairs—in none certainly more than in the field of education. In this service, "social efficiency" is becoming the chief watchword and the chief aim. No servitor is so faithful or so efficient as the independent intellectualist who has come to see that for all men, for his class among the rest, there is opportunity in organized and co-operative effort for a larger life and a larger reward than is possible in a state of primitive, inchoate, intellectual individualism. In our field, many such men are now ready, and the time is ripe.

III. METHODS

Principle III.—Scientific management finds the methods of procedure which are most efficient for actual service under actual conditions, and secures their use on the part of the workers.

Until very recently within any field of co-operative endeavor, the management felt that it had absolved at least most of its responsibility when it had assigned the various portions of the work to the various workers and had placed incentives before them to stimulate them to proper effort. Practically all initiative in the way of methods of work was left to the workers themselves. In the performance of any given task, the worker was left mostly to "trial and error," as he groped after the best way of doing the thing. The result was that in the performance of any given task one worker employed one method, another worker at his side employed a different one. Mr. Taylor tells us that in a machine shop of twenty-five years ago employing five hundred workmen, it was possible to find several score different methods used in the performance of any piece of the work. The foreman was but a promoted workman whose information was empirical like that of the rest of the men, and did not in fact exceed the information of the more experienced and best workmen of the group under him. They were about as competent to find methods as he. He confined himself therefore to assigning their work and managing the incentives. The accumulations of traditional knowledge had naturally weeded out the very poorest methods. But of those employed, some were many times more efficient in securing a product than others. But the foreman was not in a position to undertake the direction of the methods employed.

Machine-shop work has now been raised to a far higher plane where the output by the same workmen using for the most part the same machinery is now from three to ten times as large as that formerly produced, and this without laying greater burdens upon the men. The change has been brought about mostly by undertaking the control of methods. Steel-cutting industries have developed a science which controls the processes. On the basis of this science, scientific methods have been formulated and the management no longer confines itself to assigning the tasks and controlling incentives; it also definitely undertakes full control of the methods employed. This is the secret of the startling transformations in industry that are at present being brought about by the much-heralded scientific management.

In the educational world, we are at present in the stage represented by the machine-shops of twenty-five years ago. The supervisory staff distributes the various tasks of education to the various teachers, and tries in every proper way to stimulate teachers to effective effort. In the matter of method the workers are expected for the most part to take the initiative and find the methods for themselves. This freedom to grope in "trial-and-error" fashion is even considered a right of the teacher not to be taken away by the supervisory staff. The result is that in a school system employing a hundred sixth-grade teachers, let us say, we can find a great variety of methods of doing each sixth-grade task. Two years ago, Mr. Marker took the courses of study used in about a hundred of our largest American cities with a view to ascertaining the consensus of opinion as to the best methods of teaching the English language in the elementary schools, in the various grades from the third to the eighth. After tabulating the tasks performed, the time given, the materials used, the methods employed, he discovered that among the teachers in our leading American cities, every sort of thing is being done, in every sort of way, using every kind of materials at every stage of the course, with as large an amount of variation in the time alloted to the different elements as it would be possible to have. The study gave little information as to what to teach, what to use in teaching it, how to teach it, when to teach it, how long to teach it, or how to distribute the time. Conflicting opinions neutralized each other. His results presented a vivid picture of a vast "trial-and-error" experimentation and confusion covering the entire country. And this is in the field of work that is considered most important, since to it we give most time in the elementary schools.

The new and revolutionary doctrine of scientific management states in no uncertain terms that the management, the supervisory staff, has the largest share of the work in the determination of proper methods. The burden of finding the best methods is too large and too complicated to be laid on the shoulders of the teachers. The task of turning out the fullest possible product is so large that there must be division of labor. The teacher must perform his share of the work, but the supervisor must also perform his proper share. Each must be a specialist; each must cover a different portion of the task. Under scientific management, the supervisory staff, whose primary duty is direction and guidance, must therefore specialize in those matters that have most to do

with direction and guidance, namely, the science relating to the processes. The ultimate worker, the teacher in our case, must be a specialist in the performance of the labor that will produce the product. One specializes in *science*, the other in *practice*.

This does not mean such narrow specialization of the special field that neither knows much of the work of the other. As a matter of fact, the teacher must have a large understanding of the science of his work, in so far as this is understood by the supervisors, in order that he may understand their instructions, and in order that he may rationally adjust his portion of the work to the total work of the organization. On the other hand, those who guide and direct must understand the details of practice through having done the work before they can so much as understand the science in which they specialize. The educational specialist must certainly not be a narrow specialist. He must be as general in his ability as it is possible for one to be. But the tasks are so large, the ramifications are so numerous and so intricately entangled one with another, that we must specialize our work in order to bring our labors within the bounds of human possibility.

The primary functions of educational directors and supervisors, as relating to methods, are therefore: first, the discovery of the best methods of procedure in the performance of any particular educational task; and second, the giving of these discovered best methods over to the teachers for their guidance in securing a maximum product. Since so few methods, demonstrably the best, have yet been discovered with entire certainty, it is impossible yet to devote any very large amount of time to the function of distribution of this information to the teachers. This leaves the major work at the present moment in the realm of discovery of best methods, it would appear.

Schools must not experiment on the children? As a matter of fact, they are not doing much else at the present moment. Mr. Marker's study showed that they are experimenting in the teaching of the English language in almost every conceivable fashion through the country. "Trial and error" is itself nothing but blind experimentation. We can be reasonably sure that it is in the wrong direction about half the time and in the right direction about half the time. Work that looks in all directions will distribute itself in about this fashion. Rational experimentation under the guidance of the best educational light at our command cannot possibly go wrong more than half the time; and there-

fore cannot possibly be worse than the present mode of experimentation. The chances are very great that it can change the balance very considerably so that it will look in the right direction much more than 50 per cent of the time and in the wrong direction much less than 50 per cent of the time. There is no bottom to the argument that schools must not experiment.

As a matter of fact, however, there is not at the present moment any great need of setting new experiments on foot. There are already so many going on. If 50 per cent of these random experiments going on at the present time look in the right direction and 50 per cent look in the wrong direction, the immediate problem is a statistical comparison of the relative amount of results that is obtained from these various practical experiments. For guidance in the performance of this task, scales of measurement are largely lacking; but these will be at hand the moment there is a practical demand for them. The chief supervisory task of the present moment relating to methods is to take these scales of measurement and the forms of statistical organization and to measure the relative efficacy of the different methods used. While scales of measurement at the present time in many fields cannot be sufficiently delicate for finding the one absolutely best method, still scales such as we have and such as we can develop immediately are sufficiently delicate, it would appear, for measurements that can fairly definitely locate the 50 per cent of experimentation that looks in the wrong direction. If it can perform no more than this, it alone would mean tremendous progress in the ability to supervise the workers. Supervisors could say definitely that certain methods could not be used under any circumstances and that the range of experimentation must be confined to the group that is shown to be the more superior.

Let us illustrate with a concrete example or two. Suppose among schools that give sixty minutes per week to drill in penmanship, it is found that one group of schools distributes the time into thirty-minute periods twice a week; another group of schools has twenty-minute periods three times a week; another group distributes the time into twelve-minute periods of drill five times a week; a fourth group distributes the time into six-minute periods ten times a week, or a short period twice each day. Now suppose each of these groups of schools to be measured in the first week of the school year by the Thorndike or the Ayres writing scale as to quality, and tested by the stop-watch

as to speed. If they are then measured again at the end of the year in the same way, it is possible to determine which of the modes of distributing the sixty minutes of time for teaching the writing is the superior. Groups can be large enough to neutralize disturbing factors. If the six- and twelve-minute distribution secures larger results than the twenty- and thirty-minute distribution, then this factor of method in teaching handwriting is partially solved. While we have not definitely established just which length of period is best for the work, yet we have definitely shut out the longer periods of twenty and thirty minutes and we must definitely limit the length of drill period to a possible maximum of fifteen minutes. More delicate, more discriminating comparisons will have to be made before we can decide just where between the five- and the fifteen-minute period we would best fix the drill time in order best to distribute sixty minutes of drill so as to secure the maximum product. But if the supervisory staff has only the rough determination as the result of its comparative studies, it is prepared to give something over to the workers that is definite, authoritative, and usable, and a thing which the workers could not determine for themselves. The supervision under the circumstances is able to do a portion of its share in the labor of securing the product. It furnishes the demonstrably rational guidance for the worker which the latter could not secure for himself. Each supplements and assists the other in securing the product, the ultimate end of the labor of both.

The distribution of time into periods best for one grade may not be the distribution that is best for other grades. The same kind of comparative problems have to be worked out for each of the successive grades from the beginning of the teaching of this subject up to the time when the class reaches the ultimate standards set for them. The problem as stated above is how to distribute sixty minutes of drill. Another series of problems is the determination of the total amount of drill per week, whether it should be twenty minutes, forty minutes, sixty minutes, or one hundred minutes per week; and this again in connection with each of the different grades in which writing is to be given. The amount of time used and its best distribution offers therefore a very large number of problems to the directing and supervising staff in education for solution by comparative methods. This probably can be done without setting into operation any experiments in addition to those already going on.

The time employed in drill is but one of a number of factors of method. Other factors of method are: the series of drill exercises used, the distribution of time among the different kinds of drill exercises, the speed of the practice, the kinds of materials used in the practice, the different systems of arm-and-finger movements employed, sitting position, the slope of the desk, the nature of the copies presented, the time of day, the fatigue factor, the length of time elapsing after active physical exercise, the motives and incentives employed in stimulating the pupils, and the writing specialist will probably add a few other factors. In connection with each of these factors it is possible to determine by means of statistical comparisons of scale measurements the better and the poorer method of controlling each of these various factors for each of the various school grades. The problems of writing present therefore several score problems that will have to be worked out by co-operative and comparative study of the present situation before supervisors can adequately perform their share of the task in directing and supervising handwriting. If the determination of the better and the poorer modes of controlling each of these factors would result in the case of each one of them in an improved efficiency of one-half of one per cent only in each of the grades, the combined improvement would mean a doubling of our efficiency in the teaching of penmanship, or in other words the elimination of 50 per cent of waste, the release of 50 per cent of the teacher's time for other tasks.

It is clear that supervisors cannot perform their half of the task, that of guidance, on the basis of science, until they have the science on the basis of which to guide. In the past the supervisor has usually been one of the most successful and most experienced of the teachers, promoted on the basis of his relative standing. In the matter of empirical information he is superior to the younger, less experienced, less capable teachers, and is able out of his more successful experience and his observation to give them a quantity of good advice and instruction as to methods to employ. But in the case of experienced teachers, those moderately successful and those highly successful, the degree of difference between the teacher and the supervisor is so slight that the latter is unable to perform any large portion of the labor of securing the educational product. In connection with those who are best able to use his help, he can give little or no help in the way of methods. He is but a specialist of their own type, and

not a specialist of a supplemental type. He is compelled to give his better teachers almost complete freedom in the way of methods used. This tends to paralyze his efforts toward using his authority in the direction of methods even in the case of the younger and weaker teachers. The situation creates a system of privileges and immunities claimed by all the teachers in the matter of freedom to go wrong as much as they please in the selection of their methods.

When the conscientious, hard-working supervisor earnestly desires to perform his share of the task in connection with his strong teachers—under ideal conditions all are strong teachers—he finds himself unable to do so because of the almost total dearth of scientifically formulated information as to what constitutes the best control of the various factors of method. He has opinions; other men of equal ability have neutralizing opinions. This leads him to a distrust of his own opinions. When he turns to the literature of his profession for guidance, he finds more opinions, and then in a second book still other opinions which tend to neutralize those of the first book. From opinions based upon "trial-and-error" practice, he has merely turned to opinions based upon "trial-and-error" theorizing, and has not improved his situation.

For such men—and they grow more numerous day by day as we see how the rest of the world is forging ahead of us in the application of science—there is but one avenue of escape from the present condition of relative helplessness in the ability actually to direct and to supervise methods. This is the definite measuring of practical methods as they are actually employed at present.

It may be urged that the well-informed supervisor has at his command certain general principles of education that, like the fixed stars in the case of the mariner, can be used for guidance in the details of educational procedure. On the basis of these general principles it is possible to deductively determine the processes to employ in the details of teaching. His work of guidance is to see that the teacher is at all times fully alive to the nature of these guiding principles, and that she employs them in the formulation of her methods, and always measures her methods after they are formulated up against these general principles to see that the methods are correct. The weak teacher is the one who has not a command over these various general principles sufficient to make the various necessary deductions in the case of any specific situation. The supervising problem, in such a case, so far as methods go,

is to bring about a further realization of the principles in the teacher's mind and to help the teacher to the power to use the principles with certainty in devising the various daily tasks. In judging the work of teachers, weak or strong, the plan to be pursued on the part of the supervisor is to see how exactly the processes obey the general principles.

This sounds well, to be sure, and it was possible for the older school of writers on supervision to expand it into an entire volume. One does not know, however, what poor help these so-called principles furnish until one tries to apply them to concrete tasks. Suppose one gathers together all of the general educational principles that he can find, and on the basis of these principles tries deductively to determine answers to the problems of method presented by the teaching of handwriting as stated above. How many can he deductively solve with his principles?

From the general educational principles which govern in arithmetic the teaching of addition, to take another example, what are the most effective methods to use? Let us suppose for purposes of illustration that for a given class of boys the ultimate standard for speed in addition that has been set is 80 combinations a minute to be reached at the age of eighteen when these boys leave their vocational training. Now in the light of the general principles, at what age shall the 45 addition combinations be taught? What total amount of time per week is to be devoted to addition drill during the year when they are taught? What total amount of drill is to be given during the second year thereafter, the third year, the fourth year, and so on up to the time when the ultimate standard is satisfactorily attained? What shall be the distribution of the weekly drill time into periods for the first year of the work, second year, third year, fourth year, and so on through the series of years? What are the addition combinations that require much drill, what are the ones that require a medium amount of drill, and what are the ones that require but little drill? What time of day is best for the work? Should the drill be oral or written, or should there be a combination of the two? Is it best performed with abstract examples, or in connection with concrete problems? Shall drill exercises be furnished by the book, by the blackboard, or by teachers' dictation? Should the drill consist of many short exercises or fewer longer exercises? What is the effect of using the incentive of emulation in the economical securing of the product? What is the value of using exercises that involve the vocational motive or the civic motive?

Now, as a matter of fact, do we have scientific principles of education of a general sort on the basis of which these questions can be deductively answered with scientific certainty—such certainty as the farmer can use in the scientific control of his operations, or with the scientific certainty that the steel-cutting machinist can use in his operations? It is evident that our so-called principles will not serve our purpose in answering these questions. The principles are too vague, too general, too empty of content. A good many of them are probably pseudo-principles, speculatively, not scientifically, determined. They offer a form of support which the intelligent supervisor, in an age of applied science, uses with many misgivings. Since addition is almost the simplest task to be performed by education, if the principles will not guide here it would be strange if they were a safe guide in the more complicated portions of the work. Analogous problems are presented by every educational task, the more complicated ones presenting many additional factors.

The business world shows us how to proceed more nearly than any illustration that I can take from the educational field. The Harriman railroad system, embracing about 19,000 miles of railway lines and employing about 80,000 men is divided into some thirty relatively autonomous divisions. Over each of these divisions is placed a general manager having his own exclusive expert staff. In the central office in Chicago is the Director of Maintenance and Operation of the entire system, also with his expert staff. In the original organization, in the performance of any given task, each general manager with his expert staff was permitted entire freedom of initiative in the determination of the methods to be employed. The expert workers in the Chicago office did not interfere in any way with the methods employed in the different divisions. This central body confined its efforts solely to careful scientific studies of the relative efficacy of the different methods employed in performing any given task in the different divisions of the system. When their studies showed clearly and unmistakably that certain methods were producing distinctly better results in certain divisions than other methods were producing in other divisions, then the group of better methods was definitely prescribed for the use of all of the divisions; and the group of methods clearly inferior was discarded and forbidden to any of the divisions. After this step was made, the process continued. From the better group of methods, one division

chose one form, and another division chose another, and the practical experimentation continued. The purpose of doing the work in each division was not to experiment; it was to get results. It was, however, experimentation under perfectly normal conditions of experiment. It was natural, not artificial, experimentation. The central office in Chicago, continuing its careful studies of the relative efficacy of the various methods of this better group, after a time was able to say definitely that certain of those methods were superior to certain others. This led to a still further discarding of inferior methods and the still narrower limitation of the experimental efforts of different divisions.

This process leads to a gradual narrowing of the variety of possible methods to use in connection with each of the various tasks of railroad management. It means a more and more intensive study of the specific factors that enter into the few or even the single method that has shown itself distinctly superior to the others. But perfection in so complicated a field is not possible. There is always room for further study of one factor or another in the performance of any task, it would appear. This method of finding the best modes of procedure definitely closes the door to experimentation along lines that are clearly proven inferior. It consciously leaves the door open as wide as possible for every kind of experimentation that looks toward further advance. It standardizes methods by cutting off the avenues downward but does not cut off the avenues upward. In promulgating standard methods, it says to the various divisions: "The use of methods that have been proven inferior to these standardized ones is hereafter forbidden. You are, however, encouraged and will be rewarded for taking the range of methods to which efforts are now limited and perfecting them still further." The result has been that the Harriman railroad lines have presented to us the highest example of efficient railroad mangement on a large scale.

This example shows a plan of work that may well be adopted in modified form for the determination of educational methods. The expert staff in the central office of our large city systems could at the present time perform no higher task than this analysis of the relative efficacy of methods that are being employed in the different schools of the city. Some of our leading cities have definitely undertaken this task in simple fashion. The expert staffs in the offices of the state superintendents can, when they so desire, undertake the work in connec-

tion with all of the schools of the states. All this naturally would appear to be a wasteful duplication of effort unless there was some method of co-ordinating efforts, and a dividing-up of the problems. The strategic position of our national Bureau of Education with its expert staff is clearly evident. It is a bureau the possibilities of which need to be discovered by those so much in need of its labors.

Does not responsibility for investigation rest upon the universities, while only responsibility for "practical" work rests upon those in the field? Scientific management refuses to admit this. Responsibility for finding the best methods rests upon those who are responsible for directing the work. The railroad lines described do not depend upon the universities for devising methods for them, and they could not. Only the railroads have the things to be compared on the basis of which determinations can be made. In education it is only the school systems that have the practical experimentation going on, on the basis of which the necessary determinations can be made and poor methods separated from the good. The relative isolation of the university stands in the way of its being able alone to accomplish very much. If in a city or state, however, where a university is located, the university departments of education became, co-operatively at least—there need be no official bonds of connection—a portion of the expert staff engaged in the direction, supervision, and investigation of education in that city or state, the university might accomplish an enormous amount of work for the school systems concerned and at the same time perform its own function in the way of educational training of prospective teachers with greatly augmented efficiency. The isolation of the two forms of organization is, in fact, disastrous to the efficiency of both. Universities are rapidly becoming willing and ready to enter into such co-operative work. The same readiness and willingness is becoming equally evident within our progressive public education systems. It is time to get together.

From some of the preceding sections, it can be observed that the various problems to be attacked are bewilderingly numerous. In this connection, however, one must note that the number of workers is also very great. We have 1,241 superintendents of cities of 5,000 population and over. We have a still larger number of county superintendents; a yet larger number of building principals and supervisors of various sorts; 48 state departments; 581 colleges and universities,

in the majority of which education is given some attention, and in many very large attention; 288 public and private normal schools; and the rapidly expanding United States Bureau of Education. Engaged in co-operative work, with specialization and division of problems and a central bureau of publicity, an incalculable progress is easily possible.

An association of German brewers in 1862 adopted the following declaration as the corner-stone of their faith and of their practice: "Science is the golden guide-star of practice. Without it there is nothing but a blind groping in the unbounded realm of possibilities." In commenting upon this utterance, a leading metropolitan newspaper of our day has to say:

"The wisdom of that utterance of German brewers is the key to all the miracles of German progress. The German genius did not scorn that exact knowledge and systematic method which is science. It made it its golden guide-star. It did not dismiss the professor as an amiable theorist living in a remote realm of his own, useless in practical affairs. The German genius honored science, not academically but actually, and, honoring, sought its service. This wisdom science has repaid richly—and always will repay."

It is equally important that science be put in control of the processes that shape the elements of human character.

IV. QUALIFICATIONS OF TEACHERS

Principle IV.—Standard qualifications must be determined for the workers.

The determination of more or less definite qualifications for the various aspects of the teaching personality is necessary for the efficient performance of a number of other labors: the setting-up of the requirements to be met before entrance into the profession; the laying-out of courses of training for teachers previous to their service; selecting the elements of training necessary for each group of teachers during service; appointments; promotions; reductions in rank; transfers of teachers from one line of work to another; the vocational guidance and placement of teachers previous to and during their service; the retirement of teachers; the measurement of the individual teacher in each aspect of the teaching personality; the determination of the teacher's total ability; the comparison of the relative abilities of different teachers; with perhaps a number of others equally important.

Different types of work call for different types of workers. A policeman should be large and strong, while a jockey should be light and agile. A stoker, or a ditch-digger, under present conditions, would better be of sluggish mentality; whereas a lawyer or a banker requires keen and ever-alert intelligence. The primary teacher should perhaps be one who is by nature most interested in concrete realities and motor activities, whereas the teacher of relatively mature individuals should be one whose primary interests lie in the larger and more abstract relations, one who is by nature of wide intellectual vision. The nature of the work and the methods to be employed point out the qualities of personality that should be possessed by the worker.

The conscious development and application of this principle of management is to be found most clearly exemplified in the business world and in the sporting world; in less clear fashion, it is employed in the civil service, in army and police circles, and in the professions, among which our own in the conscious use of the principle presents a good example. The business world, however, furnishes us with one of the best examples for our purposes. Some years ago when the bicycle industry was at its height, Mr. Taylor, the efficiency engineer, was called upon to reorganize a large bicycle factory and to make it as efficient as was possible. His first step was what he called the scientific selection of the workers.

Among the various types of workers, there was, for example, a group of 120 girls engaged in the task of inspecting the small steel balls used in the bearings. The method employed by the girls was to let a stream of balls run slowly along the back of the hand between two fingers, examining them through a hand-lens held in the other hand, and picking out and discarding all of the balls that were firecracked, dented, or otherwise defective. The work required clear vision, quickness and deftness of movement, and long-continued mental concentration. Evidently the girl whose vision was defective, whose movements were slow or badly co-ordinated, or who was unable to bear the strain of continued mental concentration without undue and chronic fatigue was unadapted for the work. The girls had been taken just as they came when there happened to be a vacancy without any consideration as to whether they were by nature adapted or unadapted to the work.

Mr. Taylor began his task by setting up within the factory a psychological laboratory, and studying the native aptitudes and qualities of the girls. The "perception-time" and "reaction-time" of each of the girls was carefully tested. Those of slow perception and reaction were transferred to other labors

in the factory, or discharged; and only those were retained who were quick both in perception and reaction. Laboratory tests were then made of fatigue due to mental concentration; and those who were unable to bear the strain of such work were removed, and only those whose nature made mental concentration relatively easy were retained. Tests of visual acuity, weeding out those of poor vision, came in connection with the reaction-time experiments.

After this scientific selection of the workers was accomplished, together with certain other administrative matters, such as cutting down the length of the day from ten and a half hours to eight and a half hours, the giving of four rest periods in addition to the noon hour, which cut the day down considerably further, and otherwise looking after the health of the girls, also the scientific determination of right standards of performance and the standardization of the best methods of work; the result was that thirty-five girls did the work that formerly had been done by the entire one hundred and twenty, and they did it with 60 per cent greater accuracy. The result was gain on every side. For the girls, their wages were doubled, their time for leisure occupations very much extended, and their health improved; for the management, there was a saving of 50 per cent of the original cost; for the benefit of the general public, there were lower costs on the one hand and the release of eighty-five of the workers to be employed in other lines of production, thus greatly increasing the total product of the girls. The illustration shows in the most unmistakable manner the possible benefits to all of putting the right workers into the right place and devising scientific methods of direction, of supervision, and of work.

The common expression that "teachers are born, not made" indicates a very general recognition that there are certain types of personality that are well adapted for the work of teaching while there are other types of personality that are ill adapted for this work. Now, what in exact terms are the native personal attributes of such an individual? The problem is not so simple as the one of the factory girls; still our psychology is not quite so halting as to be unable to perform the task. The psychologists have the technique with which to solve the problem. Their task appears to be first to locate a fairly large sample of the best 5 per cent of teachers in the profession, those who in their original nature most probably possess the native elements, rightly proportioned, of the so-called "born teacher." The second task is to analyze out and to define in reasonably definite terms the characteristics of personality which this group of teachers exhibits. Since teachers are specialists in various ways, such determinations are needed for each of the various special groups. With such a schedule of native qualities in hand, the directors of education are in a position to select rationally those best

fitted by nature for any given department of teaching. Such individuals will take the necessary training easily, both the preliminary training before service and the continuous training during service. With this indispensable foundation for vocational guidance, the supervisors will not have to expend the major portion of their energies in the distressing and exhausting labors of directing and supervising teachers who ought never to have got into the service, or who ought to have been placed in some other department of it.

It is necessary for the higher levels of supervision that the work of the building principal be predetermined as completely as that of the teacher. This is impossible unless we predetermine the amount of supervisory help that will have to be given by knowing in reasonably accurate terms the character of the teachers admitted into service under any given principal, both on the side of native qualities and aptitudes, and the acquired qualities of training. This cannot be known without scales and standards of measurement in terms of which to state the ability of the teachers of any given building.

In its general outlines, this principle is fully accepted in the educational world. Scholarship must rise to certain levels as shown by academic training received in certain subjects and courses, and by prescribed examinations in certain subjects. Physical examinations are commonly required in our progressive city systems; and also a number of social qualities of a much less defined sort are required in fact, though not usually stated in the list of requirements.

The more definite standards of qualifications are set up in the realm of acquired qualities. While both native and acquired qualities are indispensable, yet the native ones are primordial, and certainly are the ones first to be taken care of. When this is done, when individuals of right qualities are selected, the largest factor of the training process is, in fact, cared for. They take training easily. In the case of those whose natural native qualities are not rightly proportioned, not all the training possible can make good teachers of them; training can only bring out the latencies.

The tendency at present among certification and rating systems is to emphasize more and more those native qualities. The burden of responsibility for rational vocatioanl guidance into all fields of human labor is rapidly being laid on our schools—where it belongs. The first field of its performance on the part of the educational profession, might well be

the devising of a reasonably complete system of rational vocational guidance for those who enter our own profession and for those who are to be moved along the ranks during service. Certainly the first step is to devise the complete schedules of desirable native qualities. The tendency to include such qualities is well illustrated by the method of certification in the state of Indiana, for example. In this state, in certificating a teacher who has previously taught, he is given a "success grade" which is of equal weight with the mark received upon examination in determining the teacher's standing. The "success grade" deals in part with the qualities conferred by training; it is also in very large measure a judgment as to the native qualities of personality possessed by the teacher. A detailed score-card is furnished on the basis of which the success grade is given. The following is the schedule of qualities considered desirable and their relative weights:

The Teacher ..... 100 per cent

A. Personality ..... 20 per cent
   1. Physical: health, habits, industry, ability to do things, cleanliness, neatness of attire.
   2. Mental: moral worth, habits, disposition, temperament, individuality, power of initiative, self-control, sarcasm, sincerity of purpose, attitude toward children, ability to meet people.

B. As a student ..... 15 per cent
   1. Lines of study pursued.
   2. Lectures attended.
   3. Vacation schools attended.

C. Professional development ..... 15 per cent
   1. Problems of teaching studied.
   2. Work in township institutes or teachers' meetings in cities and towns.
      a) Preparation.
      b) Presentation.
   3. Attitude toward educational meetings.
      a) Attendance.
      b) Participation.
   4. Lectures attended.
   5. Vacation schools attended.

D. As an instructor ..... 20 per cent
   1. Preparation.
      a) Before coming to class.
      b) Assignments.
      c) Skill in bringing the pupils into the right conscious attitude for the new truth to be presented.
   2. Presentation.
      a) Knowledge of the mind of the pupil.
      b) Knowledge of the matter to be presented.
      c) Knowledge of ways of presentation.
      d) Skill in presentation.
   3. Comparison of interpretation based on children's experiences.
      a) Skill in keeping the minds of all the pupils centered on the new truth being presented, and upon their own experience that will help them interpret at the same time.
   4. Generalization.
      a) Skill in leading pupils to draw correct conclusions and to state them well.
   5. Application.
      a) Skill in making pupils realize the new truth as their own. Ability in leading pupils to discover that school problems are life problems.

E. Government ..... 15 per cent
   1. Two ways.
      a) Through the conscious use of rewards and punishment.
      b) Through the inspiration of personality.
   2. Two types of order.
      a) Constrained, unnatural and dead.
      b) Free, natural and alive with the busy hum of industry that accompanies the understanding that each pupil is to do his work without disturbing his neighbors.

F. Community Interest ..... 15 per cent
   1. As illustrated by—
      a) Ability to keep pupils from withdrawing from school.
      b) Ability to secure regularity in attendance.
   2. As illustrated by—
      a) Ability to send common-school graduates to high school.
      b) Ability to send high-school graduates to higher institutions.

3. As illustrated by—
   a) Care of school property, keeping records, and making reports.
   b) Sanitary conditions, decorations, and neatness.
   c) Ability to establish libraries and young people's reading circles.
   d) Co-operation with teachers, supervisors, and school officials in school plans, exhibits, and meetings.
   e) Part taken in the plans and affairs of the community.[1]

Professor Edward C. Elliot presented to the second annual state convention of city superintendents, held at Madison in 1910, the following outlines of "A Tentative Scheme for the Measurement of Teaching Efficiency":

TOTAL TEACHING EFFICIENCY		100 points
I.	PHYSICAL EFFICIENCY—12 points	(12)
	1. Impressions—general	2
	2. Health—general	2
	3. Voice	2
	4. Habits—personal	2
	5. Energy	2
	6. Endurance	2
II.	MORAL—NATIVE EFFICIENCY—14 points	(14)
	1. Self-control	2
	2. Optimism—enthusiasm	2
	3. Sympathy—tact	2
	4. Industry—earnestness	2
	5. Adaptability	2
	6. Sense of humor	2
	7. Judicial mindedness	2
III.	ADMINISTRATIVE EFFICIENCY—10 points	(10)
	1. Initiative	2
	2. Promptness and accuracy	2
	3. Executive capacity	2
	4. Economy (time, property)	2
	5. Co-operation (associates and superiors)	2
IV.	DYNAMIC EFFICIENCY—24 points	(24)
	1. Preparation	4
	Including:	
	a) Intellectual capacity.	
	b) Academic education.	
	c) Professional training.	

[1] *Report of the Superintendent of Public Instruction of Indiana*, 1908, pp. 632–33.

2. Professional attitudes and interest 2
3. Human nature attitudes and interest
(Appreciation of values—intellectual, social, and moral, in child life) 2
4. Instructional skill 12
Including:
a) Attention and interest of pupils.
b) Formality v. vitality of instruction.
c) Motor v. verbal methods.
d) Application of the technique of teaching; organization and presentation of subject-matter; the recitation as artistic product.
e) Application of the technique of living; participation and contribution of pupils; the recitation as a democratic activity.
f) The tools and machinery of instruction; effective adaptation.
g) Assignment of work.
5. Governmental and directive skill (discipline) 4

V. PROJECTED EFFICIENCY—6 points ..... (6)
1. Continuing preparation 2
a) Daily; *b*) Weekly; *c*) Annual.
2. The school program 2
3. Increase of professional equipment (professional reading and study; travel) 2

VI. ACHIEVED EFFICIENCY—24 points ..... (24)
1. Achievement.
a) Illustrative results 8
b) Examinations; success and attainments of pupils 12
2. Stimulation of individuals and community 4

VII. SOCIAL EFFICIENCY—10 points ..... (10)
1. Intra-mural interests 2
2. Extra-mural interests
a) Cultural and ethical 2
b) Civic 2
c) School—patrons 4

These two schedules indicate a practical belief in the possibility of drawing up definite plans and specifications which exhibit the elements and proportions of personality that are necessary for the fully equipped teacher. Except in matters relating to scholarship, however, the standards of judgment are yet rather indefinite; and they are as numer-

ous as individual supervisors making judgment. In the case of the factory girls, to recur to our parallel example, anybody could know on empirical grounds that quickness of movement was a necessary quality of the worker; and the observant foreman could tell in an uncertain sort of way who was quick and who was slow. His judgment, however, was necessarily uncertain, frequently mistaken, and always quantitatively indefinite. And this uncertainty was paralyzing to effort. It seemed preferable to make no selection on the basis of native quickness, because of the frequency of mistakes, the consequent injustice to individuals, and consequent demoralization of the entire corps of workers. Scientific laboratory measurements, however, completely changed the situation. Empirical vagueness and uncertainty gave place to absolute certainty. It was possible in the case of any particular girl to say without any shadow of doubt whether she belonged to the rapid class, the class of medium speed, or the slow class. Then, when the supervisor could act with certainty, when the workers could understand the reasons for the action and could know positively that there was no injustice being done and no possibility of injustice, all mischievous inhibitions were removed. It was possible instantly to transfer any worker who was in the wrong place. It could be accomplished with benefit to all and with injury to none.

Now, in the educational field, in using the schedules given above, we are yet, with the exception of the academic subject-matter, in the empirical stage of indefinite, uncertain estimation of the matters involved. Our profession must advance along the same road as that already traversed by the best of the industrial world before we shall be able to place our workers with the same efficiency, justice, and certainty.

For the schedule of acquired qualifications, the fixing of standards of scholarship in the subject-matter of academic courses is a relatively easy task, one already so well understood as to require no discussion here. Not so easy to handle, however, are many of the other non-academic but no less necessary acquisitions. As a matter of fact, the so-called "born teacher" is not born full-grown. Every desirable native quality must be developed and trained. Each latency must be awakened into the necessary actuality. Rightly proportioned ability in each of the characteristics in the list given above requires training just as definitely and as imperatively as ability in the field of academic subject-matter. In the one class as in the other, right unfoldment of latencies can be

accomplished only with right training, and in most cases with much training.

In a previous section, we noted the one-sidedness that inevitably occurs in setting up relatively exact quantitative standards in some portions of a field of work to the neglect of such standards in other portions of the field. Now the same thing undoubtedly occurs in the case of the training, certification, rating, and placement of teachers. To standardize in relatively accurate terms the requirements for academic subject-matter and not to standardize other just as necessary aspects of personality, aspects in fact more difficult to secure, is to bring about a one-sidedness in the training and the character of the teacher, in ways so obvious as to require no statement here. The world calls the teacher a one-sided creature, and the one-sidedness of which we are accused is of exactly the type to be expected from these quantitatively definite requirements for certain aspects of personality and the neglect of such requirements for the more general human and social aspects. Now to bring about all-sidedness in desirable proportions, it appears to be altogether necessary to have a schedule that is all-sidedly definite. Vagueness of requirement always means neglect. Requirements that are always met are definite ones.

In the first paragraph of this chapter we enumerated a list of the supervisory values of such definite schedules of qualifications. We have space for only brief discussion of a few of these. One of the large problems of the supervisor is the treatment of weak teachers. Teachers are weak, however, in different ways; and one must locate the exact weakness before effective treatment can be administered. One teacher is weak in academic qualifications in the field of subject-matter; another in her academic understanding of standards, methods, and teaching processes; another has a very limited mental horizon, and does not see the elements of her work in academic perspective; another has no proper social horizon, and fails to see the elements of her work in their social relations and uses, actual and prospective; another is lacking in energy, endurance, physical buoyancy, and flexibility, though she may be very well equipped in every other way. The list of possible weaknesses is, in fact, just as long as the list of desirable qualities of personality. Weakness may occur in any one of them without occurring in any of the others.

In handling the weak teacher, the first task is to analyze out the exact nature of the weakness; second, to determine its relative intensity;

and third, to adjust the treatment to the specific weakness, in the right degree. This analysis requires definite terms in which to think and definite scales with which to measure. The schedules of standard qualifications present these necessary bases of analysis.

All teachers need to have these schedules of qualifications set before them, since they show in clear and unmistakable terms the necessary goals of effort toward high attainment in the various aspects of teaching character. And they serve as one of the greatest possible stimulations to proper effort. When teachers have before them definite things to be attained and definite levels to strive for, they can aim intelligently and can guide all their efforts intelligently. Even the strongest of teachers have their special weaknesses and their special proneness to weakness in some aspect of their being. Human nature of a high social sort is constructed in such fashion as to presuppose these social goals and these social stimulations, even in the case of the best and strongest. High character, in fact, requires strong and complicated supporting structures in far greater measure than low character. It is possible that when teachers can know definitely what is wanted of them, what is expected of them, on the part of the management, then it is at least probable, considering the abundance of good-will and conscientiousness on the part of teachers, that the major portion of the task of removing weaknesses in the teacher is taken off the shoulders of the supervising staff.

Scales and schedules of qualifications serve as the bases for the right placement of teachers. This value is of course altogether recognized in the matter of academic qualifications. Those who have had longest academic training are made teachers in the high school and those with shorter training are made teachers in the elementary school. A teacher in the high school is given charge of the department of work in which he specialized in the university; and so through the list. It is not so well recognized, however, in the matter of qualities other than the academic. It is possible in our schoolrooms to find motor-minded individuals set to the task of giving instruction in intellectual fields requiring intellectual analysis and wide intellectual vision, with disastrous results. It is possible, on the other hand, to find the intellectualist turned loose in our shops, and kitchens, and school farms, and spoiling all the work by academicizing it. It is possible to find building principals who are not community leaders by nature or experience given the responsibility for the community leadership in education. In the

last conservation congress held at Indianapolis, one of the most startling statements made, but one which was unchallenged because of the general feeling that it required no statistical evidence to give it weight, was: "Don't expect to find in strikes the greatest industrial waste; it will be found in the wrong employment of men. Out of ten men, probably one fills the job that he ought to be filling; and out of ten jobs, probably only one is filled by the man who ought to be engaged for it."

After the long amount of weeding along the entire academic line, and considering the correlation that exists between the intellectual qualities selected and other desirable personal and social qualities, the above estimate of misfit is certainly altogether too large for our profession; but except in degree there certainly is in education the same irrational placement of a large portion of its workers. The proper placement of teachers includes original appointment, promotion, reduction in rank, transfers, and retirements. Present methods of appointment are based upon a portion of such a schedule. Current methods of promotion are based upon increase of merit as shown by the taking of extension courses, by passing further examinations, or increase in length of experience. Arranging promotion according to length of experience is very common. It recognizes that those should be promoted who have the greatest ability, and it presumes that those who have taught longest have greatest ability. As a matter of fact, however, some of those who teach for a long time improve, some remain stationary, some actually decline in ability. If Mr. Bardeen is correct, there is a period of improvement of moderate length, a short stationary period, followed by a long period of decline, in the case of most teachers. Now to arrange salary schedules and promotions on the basis of length of service, while one of the best methods we have at present, is certainly highly inefficacious. One ought, in fact, to be promoted as rapidly as he can advance. He ought to become stationary when he fails to advance. He ought to be reduced in rank when he retrogrades in teaching ability or in teaching character. These further improvements of present plans, however, cannot be accomplished until we have a means of more definitely measuring teaching character and ability. The inability rationally to control promotions and reductions in matters both of position occupied and accompanying salary leaves the supervisory staff relatively powerless to control incentives and to stimulate effort, both for the development of teaching character, and for the securing of a large educational product.

No organization of men, performing any kind of work whatsoever, can so much as hope to become efficient until it can control incentives and stimulations. So long as teachers can lie down in the work and yet be advanced up the scale of promotion by the mere machinery of the organization, it must remain upon a relatively low plane of efficiency.

V. PRELIMINARY TRAINING OF TEACHERS

Principle V.—The management must train its workers previous to service in the measure demanded by its standard qualifications, or it must set up entrance requirements of so specific and detailed a nature as to enforce upon training institutions the output of a supply of workers possessing the desirable qualifications in the degree necessary for entrance into service.

Although much neglected in actual practice, this principle appears to indicate one of the major supervisory functions. Since the function is so completely neglected at times as to indicate no recognition, the statement will perhaps require some justification. The first justification lies in the fact that the nature of the work that is performed by the supervisory staff is in large measure determined by the entrance qualifications which new workers bring with them when they enter the service. If these entering teachers have been trained in low degree, or if they have been trained to improper methods of work, then the supervisory members must expend a large excess of labor in giving training to young teachers which ought to have been accomplished in the preliminary course. If, however, the younger teachers have been trained in a superior manner, then the amount of supervisory energy required for each teacher is very much less and it can be expended on a much higher professional plane, and look toward very much higher attainment. Any form of labor that will reduce the work of the supervisory staff to one-half in amount and at the same time place it upon a higher plane, is a legitimate portion of the work of the supervisory members. Unless the function is performed by one or other of several methods, the organization cannot hope to attain anything like maximum efficiency.

Looking at the matter from another viewpoint, it is clear that the responsibility stated in the principle rests upon the management of city school systems because of the relation existing between the city organization and the teachers' training institutions. These institutions are

preparing a product for use in the city school systems. It is for the school system that uses the product to say what the nature of the product is to be in all necessary details which is turned out for their use by the training institutions that are engaged in ministering to their necessities.

This relation is perfectly clear in the case of training institutions within our large cities which are integral portions of the city school system and in which the major portion of the entering teachers are trained. If our principle states the relationship correctly, the city training school cannot be an autonomous institution, with the general nature of the work left to the principal of the school and the details of it left to the heads of departments. It appears to be clearly the function of the management of the city school system, the supervisory staff, to say in minute detail what shall be the qualifications of the output of the training school; and this means the determination of the elements that enter into the training curriculum. This appears to be best accomplished in those cities where the directive faculty of the school are at the same time portions of the general supervisory organization of the city. Most progressive cities show this in the practice teaching work, and some are coming to employ it on the side of the instruction.

The performance of this function is not quite so simple in the case of smaller cities, villages, and rural districts that cannot have their own training institutions. At the present time they are more or less at the mercy of relatively autonomous and therefore—so far as the cities receiving their product are concerned—relatively irresponsible institutions. These institutions can turn out what they will, regardless of the wishes of the cities that are to receive their product; and the supervisors must take what they can get. It may be what they need, and it may fall considerably or even greatly below it. The cities themselves are relatively powerless to prescribe the product that is to be turned out for their use by the training institutions.

In practically all cities this is the situation obtaining in secondary education. Training institutions turn out what they will; and city school systems, in employing high-school teachers, feel that they must take the product whether it is of the kind they need or not. In many quarters they are coming to be very firmly of the opinion that their particular needs were but little considered in the shaping of the product that was to go to them. So long as secondary education included only

college preparatory institutions, and college-trained high-school teachers were only college preparatory teachers, the situation was probably not so serious. At present, however, cities are coming to demand of their secondary schools the education of the entire adolescent population between the ages of thirteen and seventeen or nineteen. They are coming to demand that this adolescent education train for actual life in the world of affairs; that it adapt itself scientifically to the various needs of different social classes; that it adapt itself carefully to the individual needs of different types of students; that it be psychologically adapted to the needs of the various stages of adolescence, the most complicated and the most difficult, sociologically and psychologically, of all of the stages of growth. The problems presented are endlessly numerous and complex. The professional training needed of secondary teachers is obviously far greater in amount than the professional training of elementary school teachers. A portion of the training needed by such teachers is naturally training in the special subject-matter which they are to teach; this, however, is probably the smaller portion of the training needed by such individuals.

With this serious situation confronting the directors of secondary education in our cities, they can no longer neglect the performance of this legitimate and necessary function of control, by one method or another, over the training given by the institutions that are supplying them with trained workers. Since the cities are using the product of the colleges, it is for the cities to say what this product shall be. Merely to complain that the product sent to them is not of the right type is not to perform the function. They have the same right to say to the colleges what product shall be sent to them as a transportation system has to say to a steel plant what kind of rails shall be sent to it. They are in a position to command. It is neglect of duty when they confine themselves merely to futile complaint.

How can this function be performed? There seem to be two clear ways, both of which appear to arrive at the same end. The practical business world answers the question for us in one way. Our schools are the training institutions for the workers that go into commerce, for example; the commercial organizations use the product supplied them by the commercial training institutions. The machinists' trade uses the product that comes to them from the machinists' trade courses, and so on.

Now in the case of industrial schools, each department of the practical world demands that there shall be an advisory board of men taken from their own organization who shall be responsible for the curriculum of training, for the qualifications of the teachers, and for the general efficiency of the course in training the workers for the organization concerned. The demand appears to be thoroughly sane and practical. Now what does this suggest to city school systems in the matter of the training of their workers, elementary or secondary, where this is accomplished by institutions outside of their own organization? Apparently it means advisory committees, who are active members of city school organizations, and responsible for the quality of the work that is done by teachers after they come into the organizations, who are to bear definite responsibilities for the formulation of the courses of training for the various grades and classes of teachers, and to look into the qualifications of the teachers engaged in the training of these workers and the general efficiency of the institutions. Certain departments of our universities would naturally look upon such committees as tending to limit unduly, unnecessarily, and unwarrantably, the time-honored independence and irresponsibility of those departments. Other departments, with more modern outlook, recognizing the interconnections of human affairs in an age of miraculous progress due to organization, and recognizing the social service obligations of universities, would welcome this help which would come to them from the practical workers for whom they are, in fact, laboring. Schools of education, teachers' colleges, and the departments of education would welcome it most of all, since right demands from city school systems would mean the full professional training of all secondary workers sent out from our universities. At the present time nine-tenths of these prospective secondary workers never see the inside of the quarters devoted to the professional training of teachers.

Scotland may be mentioned as an example of a country where such a form of supervision of the training institutions is exercised. The various boards of control consist of men who represent the various educational organizations that are to receive the products of the teachers' training institutions. They are not merely advisory; they are directive. Universities and normal schools are not left to an irresponsible performance of this function.

A serious drawback to the application of the principle lies in the fact

that supervisory officials are not agreed among themselves as to what should constitute the standard qualifications necessary for entering upon professional labor in the various departments, especially so in secondary education, where the need is greatest. So far as there is consensus of opinion, this opinion has not been for the most part defined in sufficiently specific and accurate terms for practical use. The lack of standards of performance on the part of the teacher within the classroom, and the lack of security as to what constitutes good methods and what poor methods necessarily results in an equal vagueness of thought as to what should be the training and qualifications of the teachers who are to perform these still more or less undefined tasks. In proportion, however, as the tasks discussed in the earlier sections of our paper are performed, supervisory officials will find themselves in a position definitely to enforce upon training institutions the output of the kind of labor which they need.

This advisory committee suggestion, which comes to us clearly defined from present demands of the business world, is probably, however, not the best, if standing alone. It may have a place. Probably the best method is a combination of specific requirements for entrance into service and of enlightened professional understanding on the part of all concerned of the various bases of these entrance standards. In its practical working out, it means: first, the formulation in specific detail of the kind of training needed by teachers entering service in every aspect of their personality, set up by the city school systems; second, it means a complete, detailed, many-paged, continuous record of the growth of any particular prospective teacher in question through all the elementary, secondary, and professional stages, a perspective backward view of the individual's growth in each aspect of teaching personality as the one thing that can show clearly whether the individual possesses the various qualifications demanded by the city school system; third, the plan requires clear understanding on the part of the supervisors of education, on the part of teachers who enter into the service, on the part of the faculty of the training institution, of the nature and reasons, social and psychological, of the various standards that are established by the city school system in its schedule of qualifications for entering teachers. With these tasks accomplished co-operatively by city school systems, they can be in a position to determine the training that is to be given to the teachers, both elementary and secondary, supplied to them by

outside institutions. They will then be able to perform efficiently a function, the responsibility for performing which even now lies upon their shoulders but which they do not adequately attempt to perform.

VI. TRAINING DURING SERVICE

Principle VI.—The worker must be kept up to standard qualifications for his kind of work during his entire service.

Any aspect of personality, whether desirable or undesirable, atrophies when not exercised. This is generally recognized in the case of muscular strength, skill, and endurance. It is less generally realized to be equally true of mental strength, skill, endurance, adaptability, and fulness of knowledge; or of social qualities, sympathies, enthusiasm, professional zeal, appreciation of the humanities, openness of mind, fulness and right proportions of emotional response, and other like desirable qualities. Science, however, teaches us that every such aspect of personality must be exercised throughout one's teaching career or it dwindles and decays, leaving hollowness, feebleness, indifference, and disproportion.

Teaching personality, taking the term in its widest sense, is not a thing to be formed once and for all time and then left to itself. The higher a quality, the more removed it is from primitive instinct, the more unstable it is, and the more quickly will it atrophy when it is not held to normal strength through exercise. The high desirable qualities of the well-proportioned teacher are of this difficult and instable kind. Unfolded only through exercise, as they are, they can be retained only through continuous exercise.

Teachers must do more, however, than merely hold their own. They must advance with age and experience. On the one hand, they must keep up with professional development in their particular field in order to keep abreast of professional progress; on the other hand, they must continually advance along the lines of promotion. One cannot retain his forcefulness and his flexibility if he continues to do the same thing year after year, however well he may do it. He must continually advance to ever new kinds of tasks in order to retain mental and social flexibility, sensitiveness, alertness, and strength.

The functions of the supervisory staff in the keeping of their workers up to standard fall into two general classes: (1) They must see that teachers have the opportunity for the desirable amount of exercise of

each of the many desirable aspects of the teaching personality. (2) They must organize and control incentives in such a manner as to stimulate the teacher to take advantage of the opportunities that are offered to them in the degree that is desirable. There may be a third important function, namely, guidance and leadership. This seems, however, to fall in part among the opportunities that are offered to teachers, and in part among the incentives and stimulations.

A. *Opportunities*

The schedules of qualifications desirable for teachers, quoted in a previous paragraph, indicate that the completely fashioned teacher must be one who rises to the full stature of humanity in every aspect of his being. His work being the full development of men, it is necessary first of all that he himself be a complete man in every proper sense of the term. This result is not to be accomplished by reading books, hearing lectures, or taking extension or summer-school courses, important as these things are in accomplishing a portion of the work. It is to be accomplished only by living a life that is rich in all the desirable phases of human experience. It is becoming more and more apparent that the teacher of today, who is able to bear the social responsibilities that the world is laying more and more upon our profession, must be a man or a woman of the world, using the term in its best sense, with the world's wisdom, the world's vision, its sense of proportion, its sympathies, its humor, and social aims. This is to be accomplished only by participation in the full, active life of the world of affairs.

The teaching life has tended, and yet tends, to be a narrow life. On duty six or seven hours at the school, with two to four hours further labor preparing lessons and looking over papers, little time, energy, or inclination is left for any other activities. The work also is exceedingly narrow because of its being highly specialized and isolated from the other departments of human affairs. The teacher's work is in a quiet eddy outside of the main currents of human action. Although he is preparing individuals for labors within the vocations, the materials that he handles have been so conventionalized as to have lost practically all of their vocational flavor, and his work within the schoolroom has practically no outlook upon the great world of human vocation. He is preparing individuals likewise for the duties of citizenship within a self-governing

community; here again his labors have been usually so conventionalized as to have lost practically all civic relations. So far as his work is concerned, therefore, he has practically no outlook, except in the case of two or three special studies, upon the restless world of civic action and reaction. The same isolation, the same remoteness of his professional labors from the life and work of the active world is just as plainly evident in the case of each of the other departments of human affairs. This is carrying specialization to such an absurd extreme as to defeat the very purposes of the specialization. It is to sever one's relations with the world in order to perform a vital function for the world.

It goes without saying that teachers must keep up with the current literature and current thought of their special subject, with all professional developments in the way of methods, textbooks, or other appliances; that they should attend teachers' meetings, educational lectures, take part in reading circles or extension courses, do school visiting, attend summer schools and teachers' institutes; that they should take advantage, in fact, of all the agencies for the improvement of teachers during service already so well described and discussed in the recent bulletin of the Bureau of Education by Professor Ruediger. These are indispensable matters, having all the values in kind if not in degree there ascribed to them. It must be confessed however that their results are relatively disappointing except where some exuberant and enthusiastic personality arouses by the very contagion of his presence some semblance of fervor of an artificial and more or less unhealthy sort. There is, in so many of these agencies for training during service, a lack of vitality. Theoretically, they seem to be most excellent and desirable; and yet they exhibit a relative failure to keep teachers alive and vigorous and continually growing.

The one thing that will give all these agencies vitality, it seems to me, is to motivate them by giving them human purpose. This is to be done by giving all of the work of the school vital social purpose, and this in turn is to be done by fully knitting up the work of the school with the life of the community. The things taught for vocational purposes are to be linked up with the vocations of the community, and the teacher is to become familiar with these vocational relationships by mingling with the men and women who are engaged in them. This will mean for the teacher and school sympathetic attitudes toward and full understanding of each of the vocations of the community that is being

served by the school, as the school prepares and fashions the various abilities that are sent out for the use of each of these vocations. Overcoming the isolation of the schools will motivate the work of the school; and it will motivate every form of activity, the agencies for training teachers during service, among the rest, that ministers to the effectiveness of the work of the school. Therefore the teacher must live a full, human life not only for the sake of the humanizing effect upon his personal character, but also indirectly to give meaning and purpose and force to the professional activities which are specifically designed for training during service. Only by overcoming the isolation of the work of the school can these already established agencies be vitalized.

Vocation, however, is but one of a number of departments of human activity. In order fully to vitalize the school and indirectly to vitalize all activities that minister to its effectiveness, it is necessary to link up the labors of the school so as to serve the necessities of each department of human activity. This means that the civic training of the school is not to be done in a social vacuum, but that it shall be definitely related to the specific social problems of the community. Only the individual who participates in these social movements can understand them in that intimate degree necessary for teaching their nature and purposes and results. This observation of and sympathetic participation in the social movements of the community appear to be the only things that can vitalize and motivate the civic elements of educational work, both that of the pupils and that of the agencies training teachers during service. Other large fields of human activity where the isolation of the school must in the same measure and manner be overcome, where its work must be linked up intimately with the outside world, and where the life of the teacher must be made as wide as the general community life, are recreation, family life, philanthropy, religion, and general social intercourse.

For the two reasons then which we have sufficiently dwelt upon, it seems evident that the most important single factor in the continuous training of teachers during service is full and sympathetic experience of human life in all its various phases. A number of things are necessary to make this possible in sufficient degree. A few of these are discussed in the following paragraphs.

I. *Time.*—The teacher cannot have the desirable variety of humanizing and socializing experience unless time is given for it. This can be accomplished in one way by cutting down the teacher's hours of labor,

by shortening the school week, or the school year. For a number of reasons, this appears to be neither desirable nor probable. The probability is that both the school week and the school year will be lengthened; it is conceivable also that the school day may be lengthened. Another method of finding the necessary time for varied experiences is by distributing the time that the teacher is on duty during the day, week, and year over a large variety of tasks. As schools become recreation centers, social and civic centers, centers of vocational training, of vocational guidance, juvenile employment bureaus, participants in social surveys and child-welfare movements of every sort, as the labors of the school become fully devoted to the service of the community, a great variety of labors, touching all departments of human affairs, are coming to be performed. The distribution of the teacher's time so that he performs a portion of his work within the classroom, and a portion of it in connection with the other varied services will be a mode of finding time. If the setting-up of definite standards of performance and the scientific determination of the best methods to employ are even half as successful in economizing time and labor in the educational world as they have proven themselves to be in the world of productive industry, then we have here another argument for the performance of these primordial tasks. It would mean the release of time now wasted in ineffective labors which dwarf the teacher, which might well be employed in socializing labors which both humanize him and render him professionally efficient.

In this more varied distribution of the teacher's time, it appears to be necessary, for widening and renewing his vision, that a portion be given him for experiences outside of his immediate community. However varied one's work may be made, if it is a continual performing year after year of the same tasks in the same community, deadly monotony settles down over it all and saps its vitality. Alertness, spontaneity, and elasticity demand continual novelty in one's work. This can be introduced by giving the teachers new points of view from which to observe their work, their charges, their community. These are to be had through changed experiences. If one moves, observes, and works in different fields, and experiences life in new ways under new conditions, his vision is renewed for the things of his own community.

One of the most familiar methods and one of the best is the visiting of the work of other teachers who are working under other conditions. In this the teacher may well begin at home by observing the work that

is being done by all the teachers of his own school. In the total series of educational processes of which his labor forms but one link, seeing the elements which enter into the process before the product reaches him, and seeing the elements that enter into it after it leaves his hands gives him an enlarged and deepened insight into the processes which he performs within his own particular sphere. Visits then to the teachers of different social or vocational classes reveal, by comparisons and contrasts, other factors and other elements which enter into the nature of one's work and which were necessarily invisible until revealed in this manner. This means familiarity with educational work of all sorts in one's own community. It certainly shows the advisability also of visiting other cities where conditions are still different, and when possible, other countries. The chief purpose of thus giving time for travel and observation, from our point of view, is the development in the workers of new points of view, on the basis of which they can further analyze their own work, understand it better, appreciate it more, as they see it in new light from new angles. Here, likewise, one finds the chief justification for distributing some portion of the teacher's time for attendance at summer schools and institutes. Coming into contact with fresh thought, with altered points of view, it gives them new ways of seeing their own work. In proportion as the summer-school work accomplishes this thing, when teachers go back to their home community, they find that the previously dull monotony of their work has vanished, and that the new points of view, the new ways of looking at each feature of their labors, give it never-ending novelty and freshness and interest. They find themselves more alert, more vigorous, not so much perhaps because of particular facts carried away from the summer school, but rather because of their renewed vision. The distribution of a portion of a teacher's time for this purpose appears to be indispensable for keeping teachers up to standard year after year as they work in the same position in the same community. If this method of renewing the teacher's vision is as valuable as it appears, it seems that, not only should time be apportioned for it by directors of education, but that the use of the time in these ways should be required; and it should be paid for. If paid for, it would have to be supervised.

II. *Energy.*—This matter is closely correlated with the preceding. Not only must teachers have time for varied activities, but it must be given at a time when teachers possess sufficient energy for engaging in

the necessary activities. After the development of more definite standards and more definite methods, it appears possible so to speed up the work that one teacher may be able to handle two shifts of pupils in academic subjects during a six-hour day with not more than two hours required for daily preparation. The teacher may then be told that the remaining four hours of the day not needed for sleep and meals may be used for the variety of necessary humanizing activities for keeping one's self up to standard. But the daily store of energy, even when developed to its maximum, is limited in amount. It may certainly all be expended in a high-pressure day of eight hours and nothing left over for the remainder of the things that must be done. The time is rendered valueless for the purpose by the lack of energy to expend during that time.

Any aspect of personality is but an avenue of expenditure of energy. The proportional strength of any particular human aspect is the same as the proportional amount of one's daily supply of energy that is expended through that particular outlet. If the daily supply of energy is drained away through a few highly specialized channels with nothing left over for others equally desirable, the result is undue enlargement of the avenues of special discharge, and a closing of the unused channels. It means hypertrophy of a specialized portion of the man and atrophy of other equally desirable portions. If he is expected to mingle freely with the members of his community, if he is to lead in civic, social, or vocational enterprise, if he is to appreciate music and literature and science, if he is to be physically vigorous, it is absolutely necessary that a portion of his daily energies be reserved for expenditure through each of these various channels.

Supervisors must therefore not only distribute the time of the teacher so that he will have an opportunity for all desirable activities, but they must regulate the intensity of the activity in such manner that work shall not be too exhausting. While work must be speeded up for the sake of efficiency, yet this particular principle shows the limitations which must be imposed upon the process, either by reducing the intensity of the labor or by cutting down the time. The most fruitful suggestion made in this connection, however, is the conservation of the health of the teacher by right regulation of living conditions both within and without the school, which would enable the teacher to live upon a much higher plane of physical efficiency, having a larger daily increment of vitality to expend.

III. *Salary.*—The necessary range and variety of human activities enumerated are not available in sufficient degree or on a sufficiently high plane unless the teacher can pay for them. He cannot have healthful and cheerful home surroundings unless he can live in a proper manner in a proper residence neighborhood. Physical and social efficiency demand that his standard of living be upon a fairly high plane in matters of clothing, diet, recreation. He must have opportunity for privacy and quiet, for study and meditation. He must live in a family in natural human fashion; not in the isolation of the boarding- or rooming-house. If he must travel and observe, he must have the means for travel. If he is to have a cultivated appreciation of the various humanities, then he must have money for the purchase of books and music and pictures. He must be able to attend the drama, the opera, the concert, the lecture. If he must attend summer schools for attaining new points of view, then he must be able to pay his way, and to pay for life upon a plane worthy of his labor, not upon the pinched and petty level so frequent in student life.

IV. *A pervading scientific spirit.*—The general spirit of work in any field is highly contagious and tends to communicate itself to all of the workers engaged. Newly employed assistants in a well-ordered hospital, although unfamiliar with scientific procedure, naturally acquire a scientific attitude because of the general atmosphere which surrounds the work. Participation in the work of a scientifically managed farm is one of the best places for developing a scientific attitude toward agriculture.

If, therefore, in our training of teachers during service we wish to develop a fuller scientific attitude toward educational problems, one of the opportunities that must be given to these teachers, one of the most powerful influences that can be employed in developing this particular spirit, is the existence in and about all educational procedure of a general atmosphere of science and rational order. The leaders of the work of education are naturally the ones who must invest the field with this general scientific atmosphere. In the work of determining standards of attainment for each kind of work and for each stage of the work; in the scientific comparison of the efficiency of various methods, all of which appear to be theoretically good; in the scientific testing of all results; in the organization of the work of the school so that it becomes laboratory procedure of the best type as well as educational procedure of the best type; in the conferences and discussions of the workers as they direct

this work and measure its results; in the scientific fraternity of teachers and supervisors, as they work shoulder to shoulder in common obedience to scientific law, supervisors being only the leaders; in the performance of these various tasks, a scientific atmosphere is thrown about all educational problems and labors. And the general spirit of the teacher is shaped to the form demanded by our newer standards of efficiency.

When the real professional training of the teacher during service is of this active scientific sort, then the reading of the teachers and their work in extension and summer schools can be made more valuable than is the case when these are given in unrelated fashion based upon no foundation in the actual activity of the teacher. When the teacher is engaged alongside of the supervisor in the solution of endlessly complicated educational problems which are continually arising in ever-various forms with each new batch of pupils, then the reading can be motivated and rationally directed so as to throw added light upon the actual vital problems in hand. Summer-school courses for teachers can likewise find solid foundations on which to build. They can thereby be made more serviceable.

In this connection it is important to notice the altered personal relations between supervisors and teachers. So long as education is mostly empirical and the empirical deductions of supervisor and teacher are different, in so far as the supervisor actually directs the methods of the teacher, his direction appears to be in large degree personal and arbitrary. It seems a violation of the teacher's understanding of what is the best method. But in proportion as scientific method comes to control educational procedure, then the primary task of the supervisor is to discover the educational law and to apply it through the labors of the teacher, while the primary task of the teacher is to find the controlling scientific law through co-operation with the supervisor and to apply it in co-operation with the supervisor. The two classes of workers stand more nearly upon the same level. They are co-operative specialists, one having specialized in the field in one way, the other having specialized in the field in another way. Each is able to supplement the work of the other. Neither is personally over the other. Both are under the law.

B. *Incentives*

Now some of these opportunities and the means offered for securing the opportunities are intrinsically desirable in themselves and are them-

selves incentives. This is the case with matters of salary and matters of time. The case, however, is different with some of the matters mentioned in the above list. Human nature is so proportioned that one is easily satisfied with life within a quiet eddy after he becomes accustomed to it, and with relative isolation from the broad currents of human affairs. Man's social nature is easily satisfied with the things and persons of his immediate environment without looking beyond his narrow social circle. Also in matters of scientific training and procedure one is easily content to remain upon a low plane. Consequently in these matters it is necessary to organize methods of stimulating social and professional impulses which are in general too weak to be relied upon exclusively. While the opportunities offered in the shape of salary and time are essentially attractive in themselves, yet it is necessary even here to place incentives for stimulating a wise use of the salary and of the time. Salaries may be expended upon either a low or a high plane, and likewise the time and energy given to teachers for purposes of self-improvement.

Incentives to be employed are of two classes: those based upon self-interest, and those based upon social instincts. On the former basis, the method is the familiar one of rewarding the teacher for his labor in proportion to the efforts expended, as shown by results. Applied to the present case, it means that the teacher who uses the time and money and other opportunities definitely provided for the purpose, in the way that secures a maximum of desirable results, as measured by the schedule of qualifications, shall receive proper reward in the way of increased salary, professional promotion, social recognition, and a number of others.

But man is not wholly self-centered. He has equally strong social instincts as well. Because of these he enjoys being of service to all whom he looks upon as belonging to his social group. It is this which is providing the solid foundations for our quickening appreciation of "social service." In proportion as the isolation of the school is overcome, and the teacher feels himself, his life, and his work, as integral portions of the total community life, in that degree he will see his work as social service. The social motive will incite him to take advantage of the opportunities offered. To a normal, rightly developed individual, there is no stronger motive among those based on self-interest.

VII. DEFINITENESS OF INSTRUCTIONS

Principle VII.—The worker must be kept supplied with detailed instructions as to the work to be done, the standards to be reached, the methods to be employed, and the appliances to be used.

After the standards of educational attainment in each subject have been determined, the task of the teacher then is to produce results of this quality in his work. After experimentation and statistical comparisons have shown the methods that are best, then these methods must be used by the teachers. When certain materials and appliances have been definitely proven superior to others, these then are the ones that must be chosen and supplied to teachers for their work. General instructions necessarily will be given to teachers in their general training previous to service, but what any particular teacher shall do within any particular school cannot be so given during one's preliminary course. The standards to be reached by one school will be different from those reached by another school located in a different social environment. The normal-school training will teach general principles, and will thus give the teacher the ability to understand instructions given by the management. In proportion as the preliminary training has been complete, the current instructions given by the supervisory staff can be brief and general. The teacher can fill in most of the necessary details.

It is the same with methods. The teacher comes to a particular school with a general understanding of the principles of method. But the methods to be employed under one set of conditions must be in part different from those employed under another set of conditions. And further, since we are at the present time making very rapid advance in the discovery of more and more efficient methods, instruction as to these newer methods can be given only by the management, and in direct connection with the work itself.

In our schools of today, this function is performed in a great variety of ways. Efficiency implies centralization of authority and definite direction by the supervisors of all processes performed; and yet, on the other hand, efficiency likewise demands that the individuality of the teacher be respected; that initiative and professional alertness be not stifled; and that the whole work be alive with spontaneity. Here we find one of the difficult supervisory problems. The problem is to centralize direction and yet keep the total organization fully alive in every unit of its being out to the ultimate worker.

Leaving the limitations of human nature aside, the theoretically most perfect form of organization and direction is the "functional management" devised by the well-known efficiency engineer, Mr. Frederick W. Taylor. This system provides for a "planning room," such as described in a previous section, the special function of which is to determine the particular standards for each kind of raw material, and the best processes or methods to be employed. After these have been determined in ways previously described, the problem, the one discussed in this section, is how best to transmit them to the actual workers.

Under the "functional" plan, the single shop foreman is superseded by several different men called "functional foremen," each of whom, acting in close conjunction with the "planning room," has his own specific duty as an expert demonstrator throughout the shop. The planning room prepares the detailed instructions in connection with every piece of work, and puts these instructions into writing; then these demonstrators or functional foremen, selected for their knowledge and skill in their particular specialties, make sure that the instructions are understood on the part of the workmen and are properly carried out. They assist the workman whenever needed, showing him the best and quickest methods, and studying the individual temperament and capacities with a view to changing a workman from one grade of work to a higher one if he possesses qualities which warrant it, or to a lower one if he proves unequal to the task before him. This constant and personal observation incites the ambitious workman to his best endeavors, since he knows that any special proficiency which he may show will result in his rapid advancement; and every such advancement is an object-lesson to the other less ambitious workmen about him whom he has left behind.

One of these demonstrators makes certain that the drawings and instructions are clearly understood; another, how best to set the job in the machine, and how to eliminate any unnecessary personal motion; another sees that the machine is run at the most efficient speed and that the particular tool is used in the proper way to enable the machine to complete its product in the shortest time; others cover every possible point required in producing the greatest output, and in maintaining the required standard of workmanship. In one of the illustrations described by Mr. Taylor there are in all eight of these functional foremen, each a specialist in his own field, and each giving special detailed instructions to the various workers so as to bring about the greatest possible efficiency.

Under this system instructions as to each piece of work are given in writing to each worker. This necessitates a very much enlarged amount of clerical work in the direction of the business. Results have shown, however, that the increased output is so much greater than the increased clerical labor involved that the latter is but a very insignificant feature of the management.

This system has many advantages. There is an almost equal division of the work and the responsibility between the management and the workmen. The management takes over all work for which it is better fitted than the workmen, while in the past the greater part of the work and almost all of the responsibility were thrown upon the men. The work is divided so that one man need attend to only a few things. It enables complete specialization of labor. It definitely fixes the responsibility for the performance of each function upon one man. It allows the workman opportunity to think out improvements by enabling him to make an intensive study of his work.

"Notwithstanding all these advantages [says Professor Duncan] the functional system of organization has not proven popular or successful in a number of plants where it has been tried. It causes men to lose initiative; it has a tendency to shift and divide the responsibility in spite of the contrary intention. This has been found to be true in several places where the plan has been tried. The difficulties that have been encountered in carrying the scheme through are: (1) It requires a great amount of clerical work to fill out instruction-cards and write out all orders and minute instructions. (2) It is exceedingly hard at times to define clearly to whom certain functions belong and upon whom the responsibility rests when things go wrong, when there are so many as eight different foremen each in part responsible for the same task."

Where the system has been given a fair trial under favorable conditions, it has been wondrously successful, as shown by results quoted in a previous chapter.

Notwithstanding this enormous success of the method, there appears to be one very serious defect in the plan. In the specialization of the workers it is assumed that the science relating to standards, methods, and processes, is almost wholly the portion of the management, whereas the routine labor and the skill necessary for carrying out the dictates of science is the portion of labor that belongs to the workman. The plan as described in most of the instances implies that the workmen are in general mostly untrained in the technical science of industry and for

this reason practically all of the thinking and the scientific direction must be written out and given in connection with each particular kind of task. It is hard to see how this could do otherwise than mechanize the worker, destroy all powers of thought and initiative, and in the end undermine in large degree his working efficiency. Where the system has failed, it appears to be chiefly because nothing is left to the initiative of the worker. The cumbersome instructions cannot be understood, or the functional foremen do not get around to him until he has lost half a day in waiting for them; if, under such circumstances, the man could interpret instructions where they are defective, or if, knowing the general processes of the industry, he could proceed with his work in some fashion at least until the functional foreman arrived, most of the actual objections would be eliminated.

The remedy for this particular defect of the system, it would appear, is the technical, industrial training of the worker previous to service, and the continuing of the technical training of the worker during service so that he is at all times reasonably familiar with the controlling science in its general outlines as used by the planning room. He could then carry out most of the labors desired by the planning room on the basis of fairly brief and general directions. On the basis of this sort of training, he could safely be left to his own ingenuity after having received general instructions as to the way things were to be done. His intelligence would enable him to recognize where his judgment was insecure, and he could know when to ask questions of the functional foremen or of the planning room as to standards and methods. Where the plan has been most completely successful, it appears that there has been intimate and friendly co-operation at all times between the management and the workmen. The workmen have thus been able to obtain some insight into the general scientific principles controlling the work, so that while definitely and wholly responsible to the management at all times, yet they still had abundant opportunities for initiative, and there was abundant responsibility upon them so as to prevent mechanization.

We have gone into a discussion of the "functional" method thus fully because it offers so many suggestions for the scientific direction of education. The form of organization of the instruction department of our better organized city school systems presents at the present time a modified form of the "functional" plan of management. Corresponding to the functional foremen of the factory, there are in this portion of the

school system the supervisors of special subjects who give definite instructions to teachers as to the particular course of training that is to be followed, the particular standards that are to be attained, the stages of attainment in reaching these standards, and the nature of methods that are to be employed. Some of the aspects of the work which frequently receive this special supervision are music, drawing, writing, physical training, medical inspection and care, manual training, domestic science, school gardening, and the training of defective children. The building principal becomes one of this number of special supervisors inasmuch as he takes care of the usual school arts, history, and geography. Sometimes this special part of the work is in part cared for by primary, intermediate, and grammar-grade supervisors who look after the so-called regular subjects.

In the form of organization, therefore, within the instructional department, our profession is rather far advanced. In the degree of development of the work, however, a countless number of things need yet to be done. The necessity of developing the planning room has already been sufficiently discussed. The results, however, of the work of the planning room must be transmitted to the teachers so that there can never be any misunderstanding as to what is expected of a teacher in the way of results or in the matter of method. This means that instruction must be given as to everything that is to be done. But as we indicated above, there is certainly a better method of giving this instruction than by giving out detailed instructions each day or week as to each individual task to be accomplished. Full technical training before and during service together with constant contact of teacher with the representatives of the planning room will enable the management to give instructions that are wholly definite and yet give them in brief general terms, leaving the teacher to the direction of his inner technical knowledge as to standards and procedure. So long as the teacher uses standard methods or better, and accomplishes standard results or better, there is no need of supervisory interference or supervisory direction. Under such circumstances, the direction is from within, and the limitations upon the teacher are set from within. The teacher's freedom is necessarily narrowly limited, but the limitations are those of law and not the limitations of personal arbitrary authority. When, however, a teacher finds himself unable to direct his work from within, then the supervisor must give definite directions as to what is to be done and

how it is to be done. Responsibility for recognizing situations where the instructions required are unusual, and such as have not been given previously, directly or indirectly, rests upon the supervisory staff. It is for them to take the initiative.

This means a considerable quantity of continuous instruction. As the planning department discovers better methods of doing any specific thing, these must be handed on to the teacher interested in that topic. At the present time these discoveries are being made in all departments of our work. As surveys of conditions bring about changes of standards; as psychological investigation throws more and more light upon the stages of growth and indicates different progressive standards in attaining the ultimate one, the information must likewise be given by the supervisory staff to the teachers concerned. Teachers must not be permitted to stand still and remain in the same department with the same kind of work continuously. They must pass up the line of promotion; they must frequently be shifted from one kind of work to another, so as to place them where their services can be the most valuable. Whenever a shift is made up or down the line or from one field to another, large responsibility must rest upon the supervisory staff for giving initial instructions as to all standards and methods. In proportion, however, as teachers are widely informed as to the general technical principles of education, these instructions can be given in relatively general form, the teacher being left to his own judgment in the matter of filling in the details. In proportion as teachers are not informed along technical lines, instruction must be proportionally specific.

On the basis of this plan it would appear that there ought to be no external interference with the teacher's freedom and initiative so long as the teacher is able to go right; but that there should be interference the instant that he cannot go right, or the instant that he does not go right. It appears that there is nothing in this to which the teacher can object. In fact, in so far as he looks upon his labor as social service, there is nothing that he could more desire than to be properly instructed where knowledge is defective, and to be set right instantly the moment that he departs from the path of professional rectitude.

This plan cannot mean the unifying of all of the work. One sometimes reads of the educational systematizer who organized his work in such fashion that the same task was being performed by each grade in each building in the city at the same time each particular day. In fact,

the plan was made to cover wider areas than the single city. But such a plan did not involve any scientific study of any individual differences between children and the necessity of variations to meet the needs of different abilities. Neither did it consider the fact that different social conditions require different treatment, and that therefore educational procedure must be always adapted to the great variety of conditions. The plan did not involve any scientific investigation, experimental or statistical, as to the nature of the best methods to be employed or the best time for the performance of each kind of work. It involved simply the arbitrary authority of one man or one central body of men. The centralized method of "functional organization" discussed here bears little resemblance to this fortunately disappearing method. Resemblance exists only in the matter of centralization of authority and definiteness of task.

Teachers cannot be permitted to follow caprice in method. When a method which is clearly superior to all other methods has been discovered, it alone can be employed. To neglect this function and to excuse one's negligence by proclaiming the value of the freedom of the teacher was perhaps justifiable under our earlier empiricism, when the supervisors were merely promoted teachers and on the scientific side at least knew little more about standards and methods than the rank and file. Today it is an excuse that appears fair, but is in part but a respectable cover for ignorance and indolence. Nothing less than this is fair to the teacher. The amount of knowledge required at the present time in even elementary education is so extensive that no one individual can be expected to cover it all. The principal must specialize in one way and the teacher in another so that their efforts may supplement each other. A supervisor's primary function is specialization in the science of the subject whereas the teacher's specialization is in the practice of the subject.

VIII. OTHER PRINCIPLES

Owing to the limitations of space, application of other general principles of management to the problems of education cannot here be made. Further discussion might well cover such principles as the following:

Principle VIII.—It is a function of the management to discover and to supply the tools and appliances that are the most effective for the work in hand.

Principle IX.—Responsibility must be definite and undivided in the case of each task to be performed in the total series of processes.

Principle X.—Incentives must be placed before the workers so as to stimulate the output on their part of the optimum product.

Principle XI.—In a productive organization, the management must determine the order and sequence of all of the various processes through which the raw material or the partially developed product shall pass, in order to bring about the greatest possible effectiveness and economy; and it must see that the raw material or partially finished product is actually passed on from process to process, from worker to worker, in the manner that is most effective and most economical.

14 DAY USE
RETURN TO DESK FROM WHICH BORROWED
EDUCATION-PSYCHOLOGY
LIBRARY
This book is due on the last date stamped below, or
on the date to which renewed.
Renewed books are subject to immediate recall.

7 DAY USE SUMMER	DURING SESSIONS
APR 13 1965	
APR 8 RECD -10 AM	
AUG 1 1972	
AUG 31 REC'D -3 PM	

LD 21–50m-12,'61
(C4796s10)476

General Library
University of California
Berkeley

U.C. BERKELEY LIBRARIES
C005684704